Review / Derleme

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Superior hypogastric plexus (SHP) block during minimally invasive hysterectomy: A systematic review

Minimal invaziv histerektomi sırasında superior hipogastrik pleksus (SHP) bloğu: Sistematik bir derleme

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Abstract

To systematically summarize the efficacy and safety of superior hypogastric plexus (SHP) block versus no SHP block among patients undergoing minimally invasive hysterectomy (MIH). Five information sources were screened from inception until 04.04.2022 and comprised the Cochrane Central Register of Controlled Trials, PubMed, Embase, Scopus, and Web of Science. The inclusion criteria comprised (i) patients: individuals undergoing MIH, (ii) intervention: SHP block, (iii) Comparator: no SHP block, (iv) Outcomes: postoperative pain, postoperative opioid consumption, operation time, estimated intraoperative blood loss, hospital stay, and complications/toxicities, and (v) Study design: randomized controlled trials (RCTs) and non-randomized comparative trials published in peer-reviewed journals. Owing to the insignificant number of available studies, methodologic heterogeneity, and procedural variances, it was impossible to carry out a quantitative meta-analysis. Hence, the results of the included studies were only reported qualitatively (descriptively). Three studies (2 RCTs and 1 cohort study), comprising 210 patients (SHP=107 and non-SHP=103) were included in the qualitative synthesis. Overall, the included studies had a low risk of bias. The results showed that SHP block appeared largely safe and could reduce postoperative pain and opioid consumption. However, SHP block did not offer clinical benefits in terms of reduced operation time, intraoperative blood loss, and hospital stay compared with non-SHP block. Among patients undergoing MIH, this first ever systematic review showed that SHP block was safe and exhibited potential analgesic and opioid-sparing effects postoperatively. Additional RCTs are needed to carry out a powered meta-analysis and validate the findings.

Keywords: Superior hypogastric plexus, hysterectomy, minimally invasive surgery, postoperative pain, systematic review

Öz

Minimal invaziv histerektomi (MİH) uygulanan hastalarda superior hipogastrik pleksus (SHP) bloğunun etkinliğini ve güvenliğini SHP bloğu uygulanmaması ile karşılaştırarak sistematik olarak özetlemektir. Başlangıçtan 04.04.2022'ye kadar beş bilgi kaynağı tarandı ve Cochrane Central Register of Controlled Trials, PubMed, Embase, Scopus ve Web of Science'dan oluşuyordu. Dahil etme kriterleri şunlardan oluşuyordu: (i) Hastalar: MİH uygulanan bireyler, (ii) Müdahale: SHP bloğu, (iii) Karşılaştırıcı: SHP bloğu yok, (iv) Sonuçlar: Postoperatif ağrı, postoperatif opioid tüketimi, ameliyat süresi, tahmini intraoperatif kan kaybı, hastanede kalış ve komplikasyonlar/toksisiteler ve (v) Çalışma tasarımı: randomize kontrollü çalışmalar (RCT) ve hakemli dergilerde yayınlanan randomize olmayan karşılaştırmalı çalışmalar. Çok az sayıda mevcut çalışma, metodolojik heterojenlik ve prosedürel farklılıklar nedeniyle nicel bir meta-analiz yapmak mümkün olmadı. Bu nedenle, dahil edilen çalışmaların sonuçları yalnızca nitel (tanımlayıcı) olarak rapor edilmiştir. Kalitatif senteze 210 hastayı (SHP=107 ve SHP olmayan=103) içeren üç çalışma (2 RCT ve 1 kohort çalışması) dahil edildi. Genel olarak, dahil edilen çalışmaların bias hatası riski düşüktü. Sonuçlar, SHP bloğunun büyük ölçüde güvenli göründüğünü ve potansiyel olarak postoperatif ağrı ve opioid tüketimini azaltabileceğini gösterdi. Bununla birlikte, SHP bloğu, SHP olmayan bloğa kıyasla daha kısa operasyon süresi, intraoperatif kan kaybı ve hastanede kalış açısından klinik fayda sağlamadı. MİH uygulanan hastalar arasında, bu ilk sistematik derleme, SHP bloğunun güvenli olduğunu ve postoperatif dönemde potansiyel analjezik ve opioid koruyucu etkiler sergilediğini gösterdi. Güçlü bir meta-analiz yürütmek ve bulguları doğrulamak için ek RCT'lere ihtiyaç vardır.

Anahtar Kelimeler: Superior hipogastrik pleksus, histerektomi, minimal invaziv cerrahi, postoperatif ağrı, sistematik inceleme

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Introduction

Minimally invasive hysterectomy (MIH) can be performed via various routes, including vaginally, laparoscopically, and robotically. Generally, MIH is favored over abdominal hysterectomy for patients with benign gynecologic conditions[1]. Key advantages of MIH comprise lower complication rates, shorter hospitalization, and better quality of life[2,3]. Nevertheless, severe postoperative pain remains a significant complaint that often warrants postoperative opioid consumption[4].

The origin of postoperative pain following MIH can be ascribed to somatic and visceral pain sources[5]. The somatic pain source originates from nociceptive receptors found in the skin and deep tissue (i.e., fascia, muscle, and subcutaneous tissue) of the abdominal wall. Conversely, the visceral pain source originates from a principal autonomic innervation to the pelvis via the superior hypogastric plexus (SHP)[6]. Hence, blockade or neurectomy of the SHP has been advocated as a plausible strategy to mitigate chronic pelvic pain secondary to cancerous and non-cancerous causes[7].

Few studies have examined the efficacy of SHP block on reducing postoperative pain and opioid consumption among patients undergoing MIH[8-10]. However, the results have been limited by the small sample size of participants, contradictory findings, and different study designs. To our understanding, no study thus far has been conducted to systematically assemble evidence on the topic and synthesize solid conclusions. Such research is pivotal to informing evidence-based clinical decisions, highlighting the literature gaps, and pinpoint the future directions.

Therefore, the objective of this investigation was to conduct a systematic review and meta-analysis of all controlled studies that examined the efficacy and safety of SHP block versus no SHP block among patients undergoing MIH.

Methods

Study Protocol and Registration

This investigation was conducted in compliance with the guidelines underlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[11] and the Cochrane Handbook for Systematic Reviews of Interventions[12]. Moreover, the protocol of this investigation was not retrospectively recorded in the International Prospective Register of Systematic Reviews (PROSPERO). Additionally, ethical approval was not warranted as this investigation used only published literature.

Inclusion and Exclusion Criteria

The inclusion criteria comprised (i) patients: individuals undergoing MIH, (ii) intervention: SHP block, (iii) Comparator: no SHP block, (iv) outcomes: postoperative pain, postoperative opioid consumption, operation time, estimated intraoperative blood loss, hospital stay, and complications/toxicities, and (v) study design: randomized controlled trials (RCTs) and non-randomized comparative trials published in peer-reviewed journals. The exclusion criteria comprised non-original studies (i.e., reviews, editorials, and abstracts) and studies involving patients undergoing abdominal (open) hysterectomy.

Search Strategy, Information Sources, and The Study Selection Process

The following query search was used in all databases: (superior hypogastric plexus OR SHP OR presacral plexus OR presacral nerve) AND (block OR neurolysis OR neurectomy) AND (hysterectomy). No filters were used during the search for information sources. Supplemental Table 1 shows the precise query search strategy used in all information sources.

Five information sources were screened from inception until 04.04.2022 and comprised the Cochrane Central Register of Controlled Trials, PubMed, Embase, Scopus, and Web of Science.

Table 1. The baseline characteristics of the included studies

Study ID (Author, year)	Trial registration	Country	Study design	Groups	n	Age in years	BMI in kg/m^2	Route of MIH	Details of SHP intervention
Aytuluk et al.[8]	NCT # NCT03427840	Turkey	Non-randomized cohort study	SHP	30	52.73±8.54	28.81±3.96	Laparoscopic	Performed at the end of the MIH with 30 mL of 0.25% bupivacaine
				Non-SHP	30	49.03±5.34	29.11±3.04		
Clark et al.[9]	NCT # NCT03283436	United States	Randomized controlled trial	SHP	50	44 (8.0)	28.7 (9.0)	Laparoscopic	Performed at the start of the MIH with 10 mL of 0.25% bupivacaine
				Non-SHP	50	45 (8.0)	30.5 (10.2)		
De Silva et al.[10]	ACTRN # 12620000242921	Australia	Randomized controlled trial	SHP	27	43±6.4	26.6±6	Laparoscopic, robotic	Performed at the end of the MIH with 10 mL of 0.75% ropivacaine
				Non-SHP	23	43.1±8.6	27±6.7		

ACTRN: Australian New Zealand Clinical Trials Registry, BMI: Body mass index, MIH: Minimally invasive hysterectomy, NCT: National Clinical Trial, SHP: Superior hypogastric plexus, Age and BMI were reported as mean ± standard deviation or median (interquartile range)

For the study selection process, after the removal of duplicate citations, the remaining ones were screened for potential eligibility based on reading of titles and abstracts, and the irrelevant ones were omitted. Afterward, the remaining citations were screened for potential eligibility via full-text evaluation, and the irrelevant ones were omitted. Besides, the reference lists of all eligible studies and recent reviews were manually screened for potential inclusion of other relevant studies. Two investigators completed the search of information sources and study selection process independently, and inconsistencies were resolved by consensus.

Data Items, Risk of Bias Assessment, and The Data Collection Process

The following baseline characteristics of the included studies were extracted: last author's name, date of publication, trial registration identifier, country of publication, study arms, sample size of patients, the age of patients, body mass index of patients, the route of MIH, and details of SHP block. The outcomes of this investigation comprised postoperative pain [according to the 10-point visual analogue scale (VAS) scoring system], postoperative opioid consumption [according to the morphine milligram equivalent (MME) unit], operation time (min), estimated intraoperative blood loss (mL), length of hospital stay (d), and complications (e.g., mechanical injury to anatomical structures) or toxicities (e.g., local anesthetic-related side effects such as bradycardia and hypotension) of the SHP block.

The quality of included studies was appraised according to the Cochrane risk of bias assessment tool for RCTs[13] and the Newcastle-Ottawa scale for nonrandomized comparative trials with cohort study designs[14].

All the data items were collected according to a predetermined form. Two pairs of investigators extracted the data items independently, and inconsistencies were resolved by consensus among the investigators of each pair.

Synthesis of Data

A quantitative meta-analysis was initially planned. However, owing to the insignificant number of available studies, methodologic heterogeneity (i.e., different study designs), and procedural variances (i.e., different routes of MIH), it was impossible to carry out a quantitative meta-analysis. Hence, the results of the included studies were only reported qualitatively (descriptively).

Results

Summary of The Literature Search and Baseline Characteristics of The Included Studies

Figure 1 displays the PRISMA flowchart. Overall, 112 citations were retrieved from the information sources, of which 52 citations were excluded from the duplication. Of the remaining 60 citations, 53 citations were excluded after reading the titles and abstracts. The remaining seven citations were subjected to full-text reading, of which four citations were excluded

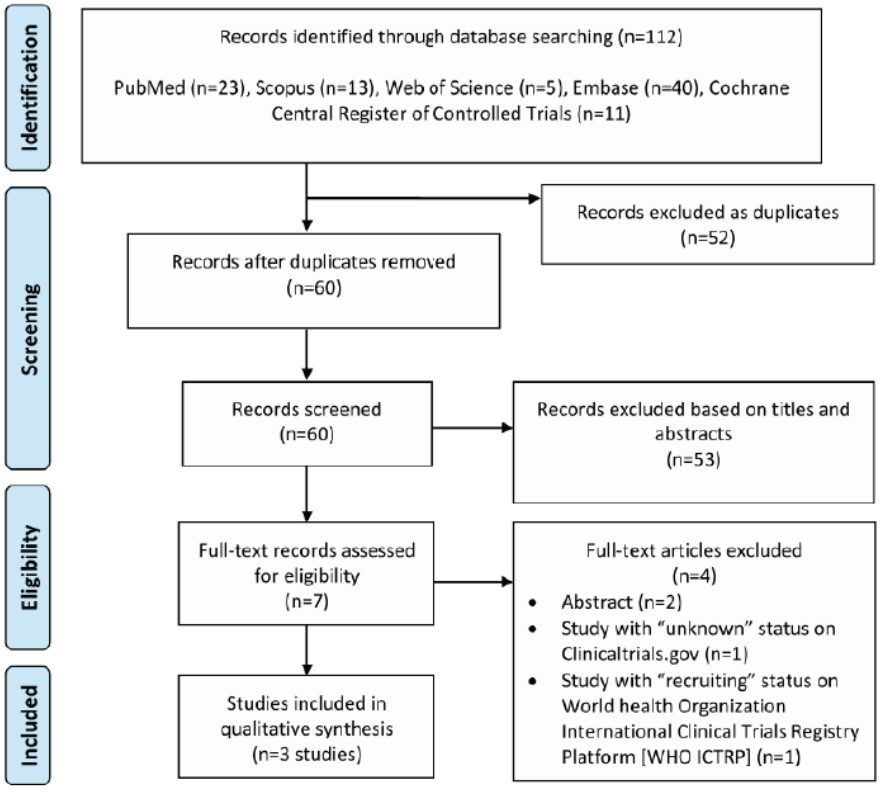

Figure 1. The PRISMA flowchart for literature search

with reasons: abstract (n=2), study with "unknown" status on Clinicaltrials.gov (n=1), and study with "recruiting" status on World Health Organization International Clinical Trials Registry Platform [WHO ICTRP] (n=1). Finally, three studies, comprising 210 patients (SHP=107 and non-SHP=103) were included in this systematic review[8-10]. These studies were published during 2019-2022 and conducted in Turkey (n=1) [8], United States of America (n=1)[9], and Australia (n=1)[10]. One study was a nonrandomized comparative trial (i.e., cohort study)[8] whereas the remaining two studies were RCTs[9,10]. The routes of MIH were laparoscopic in two studies[8,9] and mixed laparoscopic/robotic in one study[10]. The SHP block was performed at the start of MIH in one study[9] and at the end of the MIH in two studies[8,10]. The type of local anesthetic comprised 0.25% bupivacaine in two studies (amount ranging from 10-30 mL)[8,9] and 0.75% ropivacaine (10 mL) in one study[10]. Table 1 summarizes the baseline characteristics of the included studies.

Summary of Risk of Bias of The Included Studies

Figure 2 shows the risk of bias summary of the two RCTs. Both RCTs[9,10] were single-blinded and hence, the domain of performance bias was scored as high risk. Otherwise, all other domains were scored as low risk. Supplemental Table 2 shows the risk of bias assessment for the nonrandomized comparative trial (cohort study)[8]. The overall Newcastle-Ottawa scale score was 8 stars, suggesting "high-quality" and corresponding to "good quality" according to the Agency for Healthcare Research and Quality (AHRQ) standards[15].

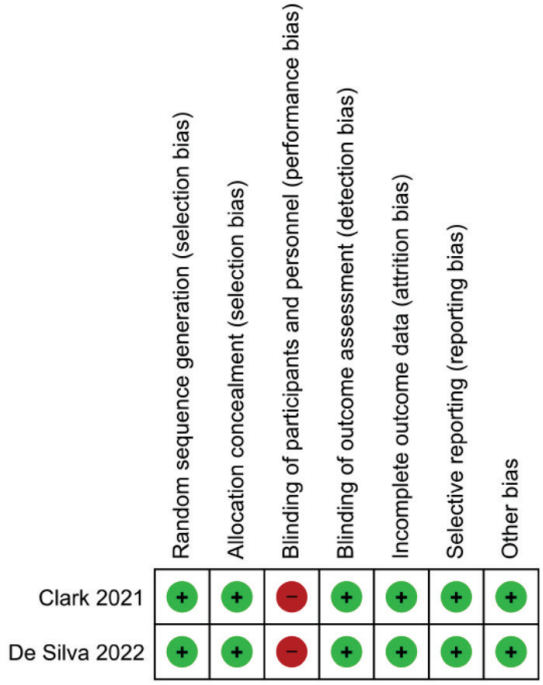

Figure 2. Quality assessment according to the Cochrane risk of bias tool for randomized controlled trials

Qualitative Synthesis of Outcomes

Table 2 details the main outcomes of the three systematically reviewed studies. Postoperative pain score at 24 h was reported in three studies[8-10]. Two studies[8,10] found that VAS scores were significantly lower in favor of the SHP group compared with the non-SHP group. However, while the RCT by Clark et al.[9] showed lower VAS scores in favor of the SHP group compared with the non-SHP group, the difference was not statistically significant.

Postoperative opioid consumption in 24 h was reported in three studies[8-10]. Aytuluk et al.[8] showed that the total MME consumption at both post-anesthesia care unit and surgical ward was significantly reduced in favor of the SHP group compared with the non-SHP group. Similar results were reported by De Silva et al.[10]. While the RCT by Clark et al.[9] showed lower MME in the recovery unit and surgical ward in favor of the SHP group compared with the non-SHP group, the difference was not statistically significant.

The mean operation time was reported in three studies[8-10], all of which showed no significant difference between the groups. Moreover, the estimated intraoperative blood loss was reported in two studies[9,10], both of which showed no significant difference between the groups. Furthermore, the length of hospital stay was reported in two studies[8,9], both of which showed no significant difference between the groups.

Intraoperative and postoperative complications were reported in three studies[8-10]. Aytuluk et al.[8] showed there was no difference in the rate of postoperative nausea and vomiting between the groups. All the three studies[8-10] showed no adverse events in the SHP group, such as mechanical injury to anatomical structures or toxicities arising from local anesthetic injection (e.g., bradycardia and hypotension).

Discussion

Summary of Findings

This systematic review was carried out to summarize the analgesic efficacy of SHP block versus no SHP block among patients undergoing MIH. Three studies, comprising 210 patients (SHP=107 and non-SHP=103) were included in the qualitative synthesis. Overall, the included studies had a low risk of bias. The results showed that SHP block appeared largely safe and could reduce postoperative pain and opioid consumption. However, SHP block did not offer clinical benefits in terms of reduced operation time, intraoperative blood loss, and hospital stay compared with non-SHP block.

Interpretation of Findings and Clinical Implications

Adequate control of postoperative pain following MIH is an important endpoint. This is because poor control of postoperative pain is disadvantageously connected to many adverse consequences. Such adverse consequences comprise long-term opioid addiction, reduced quality of life, acknowledged mobilization, extended hospitalization, and

higher healthcare costs[16]. Notably, prolonged postoperative analgesia with opioid is not without its adverse aftermath, such as nausea, vomiting, constipation, drowsiness, respiratory depression, and possibly chronic addiction if postoperative pain is not adequately controlled[17]. Hence, opioid-free multimodal analgesic approaches to decrease postoperative pain lessen opioid intake, and accelerate recovery are badly warranted[16]. Our systematic review revealed that SHP block was correlated with a substantial reduction in postoperative pain. Moreover, the favorable analgesic effects of SHP block were further corroborated by the decreased consumption of postoperative opioids.

Conventionally, SHP block is performed by injecting a local anesthetic agent (e.g., ropivacaine or bupivacaine) near the SHP (i.e., presacral region) by using anatomic landmarks to determine the injection site. Thus, this procedure

Table 2. Summary of the main outcomes

Study ID (Author, year)	Main outcomes
Aytuluk et al.[8]	• Mean VAS pain score at PACU was significantly lower in favor of the SHP compared with the non-SHP group (SHP=3.2±1.35, non-SHP=6.59±1.94, p<0.001) • Mean VAS pain score at 1 hour was significantly lower in favor of the SHP compared with the non-SHP group (SHP=2.17±1.12, non-SHP=5.47±2.26, p<0.001) • Mean VAS pain score at 24 hours was significantly lower in favor of the SHP compared with the non-SHP group (SHP=0.47±0.68, non-SHP=1.37±1.59, p=0.021) • Mean rescue analgesic time (min) was significantly delayed in favor of the SHP compared with the non-SHP group (SHP=825±322.86, non-SHP=325±180.19, p<0001) • Mean opioid consumption (MME) at PACU was significantly lower in favor of the SHP compared with the non-SHP group (SHP=0.6±2.5, non-SHP=1.3±3.4, p<0.001) • Mean opioid consumption (MME) at surgical ward was significantly lower in favor of the SHP compared with the non-SHP group (SHP=0±0, non-SHP=1.3±3.5, p=0.04) • Mean operation time (min) did not significantly differ between both groups (SHP=114.5±42.19, non-SHP=115.83±35.67, p=0.835) • Mean estimated intraoperative blood loss (mL) was not reported • Mean hospital stay (d) did not significantly differ between both groups (SHP=2.6±0.67, non-SHP=2.5±0.68, p=0.501) • Rate of postoperative nausea and vomiting did not significantly differ between both groups (SHP=10%, non-SHP=10%) • No complications (e.g., mechanical injury to anatomical structures) or toxicities (e.g., sympatholytic effects of bradycardia or hypotension) occurred in the SHP group
Clark et al.[9]	• Median VAS pain score at 2 hours did not significantly differ between both groups [SHP=3.9 (IQR=4.7), non-SHP=4.7 (IQR=2.9), p=0.45] • Median VAS pain score at 24 hours did not significantly differ between both groups [SHP=5 (IQR=5.5), non-SHP=6 (IQR=2.8), p=0.42] • Median opioid consumption (MME) at PACU did not significantly differ between both groups [SHP=5 (IQR=14.2), non-SHP=7.5 (IQR=12.5), p=0.22] • Median opioid consumption (MME) at 24 hours did not significantly differ between both groups [SHP=5 (IQR=13.8), non-SHP=10.2 (IQR=12.5), p=0.1] • Median operation time (min) did not significantly differ between both groups [SHP=110 (IQR=56), non-SHP=130.5 (IQR=55), p>0.05] • Median estimated intraoperative blood loss (mL) did not significantly differ between both groups [SHP=50 (IQR=50), non-SHP=50 (IQR=50), p>0.05] • Median hospital stay (d) did not significantly differ between both groups [SHP=0 (IQR=0), non-SHP=0 (IQR=0), p=0.78] • No complications (e.g., mechanical injury to anatomical structures) or toxicities (e.g., sympatholytic effects of bradycardia or hypotension) occurred in the SHP group
De Silva et al.[10]	• Mean VAS pain score at 24 hours was significantly lower in favor of the SHP compared with the non-SHP group (SHP=1.8, 95% CI: 1.5-2.1, non-SHP=2.6, 95% CI: 2.3-2.9) • Mean opioid consumption (MME) at 24 hours was significantly lower in favor of the SHP compared with the non-SHP group (SHP=33.1±4.3, non-SHP=54.9±6.8, p=0.0077) • Mean operation time (min) did not significantly differ between both groups (SHP=127±48, non-SHP=128.6±58.9, p=0.92) • Mean estimated intraoperative blood loss (ml) did not significantly differ between both groups (SHP=141.9±82.2, non-SHP=156.5±80.2, p=0.53) • No complications (e.g., mechanical injury to anatomical structures) or toxicities (e.g., sympatholytic effects of bradycardia or hypotension) occurred in the SHP group

CI: Confidence interval, IQR: Interquartile range, MME: Morphine milligram equivalent, PACU: Post-anesthesia care unit, SHP: Superior hypogastric plexus, VAS: Visual analogue scale, Aytuluk 2018 and De Silva 2022 reported findings as mean ± standard deviation, whereas Clark 2021 study reported findings as median [interquartile range]

necessitates the guidance of an imaging-based modality, such as fluoroscopy, ultrasonography, or computed tomography. However, during MIH, the abdominal and pelvic anatomical structures are well exposed intraoperatively, allowing for easy and direct access to the SHP[8]. Hence, intraoperative SHP block could be done rather simply and rapidly, without an obligatory need for imaging-based guidance. Since the SHP is anatomically situated close to key structures (e.g., somatic nerves, vertebral column, urinary bladder, and intestines), the SHP block procedure may be associated with potential intraoperative iatrogenic complications. Moreover, note that hemodynamic instability such as hypotension and bradycardia is possible, yet very rare, aftermath of the SHP block with ropivacaine or bupivacaine[8-10,18]. Overall, our systematic review confirmed that SHP block during MIH was technically feasible, quick to perform without extending operation time, and largely safe without adverse events.

SHP block has been depicted to improve the management of chronic pelvic pain arising from various cancer- and non-cancer-related etiologies[7]. Cancer-related etiologies comprise gynecologic and non-gynecologic pelvic malignancies, such as uterine, ovarian, cervical, bladder, prostatic, and rectal cancers. However, non-cancer-related etiologies comprise dysmenorrhea, endometriosis, pelvic malignant pain, pelvic inflammatory disease, and interstitial cystitis. Here, our systematic review expands the utility horizon of SHP block to include a gynecologic indication for postoperative analgesia following MIH. SHP block has been previously illustrated to successfully manage postoperative pain among patients undergoing abdominal hysterectomy[5,19] and cesarean section[20,21].

The RCT by Clark et al.[9] concluded that among patients undergoing MIH (laparoscopic route) with enhanced recovery after surgery (ERAS) protocol, SHP block failed to substantially reduce postoperative pain score and opioid consumption at different time points. The authors highlight several elucidation for these findings. Most notably, all patients were enrolled in an ERAS protocol, which decreases physiologic procedural stress, reduce hospitalization, minimize postoperative pain, and accelerate overall recovery[22,23]. All patients in this trial received SHP block and incisional analgesia, hence the patients benefited from alleviation of both visceral pelvic pain[24] and somatic pain (i.e., skin and deep tissue of abdominal wall), respectively. An additional reason was ascribed to the timing and volume of the SHP block. The SHP block was administered early at the beginning of the procedure, which might not have been adequate enough to produce sufficient postoperative analgesia. Moreover, the volume of the SHP block was relatively small (10 mL. It has been reported that the injection of higher volumes (15 to 18 mL) of local anesthetic or neurolytic agents during SHP block is associated with better analgesic responses than lower volumes[24,25]. Therefore, important clinical implications comprise the administration of SHP block at the end of the procedure with higher volumes, administration of incisional analgesia to lessen somatic pain, and enrollment of patients in ERAS perioperative protocols.

Strengths and Limitations

This investigation had several strengths that ought to be emphasized. To our understanding, we performed the first ever systematic review to examine the efficacy of SHP block for the management of postoperative pain following MIH. We included both nonrandomized comparative studies and RCTs in our investigation to increase the power of the pooled conclusions, which is a recommendation that is highly endorsed[26,27]. Additionally, we performed a PRISMA-complaint research investigation and reported as many outcomes as possible.

Nonetheless, this investigation equally harbors several limitations that ought to be underlined. The major limitation includes the small number of eligible studies and the corresponding small sample size of analyzed patients. An additional limitation includes the between-study heterogeneity, including variances in surgical procedures (e.g., route of MIH and type/dose/volume of the injected local anesthetic) and study designs (i.e., RCTs vs. nonrandomized comparative trials). These factors may also have somehow impacted the power of the conclusions. Because of the small number of included studies and clinical/methodologic heterogeneity, the results were only summarized systematically without a quantitative meta-analysis. Lastly, although the eligible studies were not double-blind, the measured outcomes (i.e., VAS score and opioid consumption) were less likely to be significantly impacted by this lack of blinding.

Future Directions

Taking into consideration the limited number of systematically reviewed studies, into additional large-sized RCTs are needed to validate the results of this investigation. As the origin of postoperative pain following MIH can arise from somatic and visceral sources[5], it will be worthwhile to examine the combined additive efficacy of incisional analgesia or abdominal wall plane block in addition to SHP block to alleviate somatic and visceral pain, respectively. Additional research may examine the ideal local anesthetic agent (ropivacaine versus bupivacaine) for the SHP block during MIH. Also, it is equally important to conduct dose-response analysis to identify the dose/volume that is associated with maximal efficacy and minimal toxicity. Lastly, it is meaningful to identify the cohorts of patients (i.e., stratified based on route of MIH, patient demographics, or clinical indications) who are more likely to benefit the most from postoperative analgesia with SHP block.

Conclusion

Among patients undergoing MIH, this systematic review showed that SHP block appeared largely safe and could reduce postoperative pain and opioid consumption. However, SHP block did not offer clinical benefits in terms of reduced intraoperative blood loss, operation time, and hospital stay

compared with non-SHP block. In view of the limitations of this systematic review, additional RCTs are needed to carry out a meta-analysis and validate the findings.

Ethics

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Concept: M.A., A.A.Z., Design: M.A., A.A.Z., Data collection or processing: M.A., O.A., İ.A.A.B., H.S., Analysis or interpretation: M.A., A.A.Z., Literature search: M.A., A.A.Z., O.A., İ.A.A.B., H.S., Writing: M.A., A.A.Z., Reviewing manuscript for editorial and intellectual contents: M.A., A.A.Z., O.A., İ.A.A.B., H.S., Approval of manuscript for submission: M.A., A.A.Z., O.A., İ.A.A.B., H.S.

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Supplemental Table 1. The precise query search strategy used in all information sources

PubMed All Fields: (superior hypogastric plexus OR SHP OR presacral plexus OR presacral nerve) AND (block OR neurolysis OR neurectomy) AND (hysterectomy)
Scopus TITLE-ABS-KEY {Superior hypogastric plexus} OR SHP OR {presacral plexus} OR {presacral nerve} AND (block OR neurolysis OR neurectomy) AND (hysterectomy)
Web of Science All Fields: (superior hypogastric plexus OR SHP OR presacral plexus OR presacral nerve) AND (block OR neurolysis OR neurectomy) AND (hysterectomy)
Embase Quick search: ('superior hypogastric plexus'/exp OR 'superior hypogastric plexus' OR (superior AND hypogastric AND ('plexus'/exp OR plexus)) OR shp OR 'presacral plexus' OR (presacral AND ('plexus'/exp OR plexus)) OR 'presacral nerve' OR (presacral AND ('nerve'/exp OR nerve))) AND (block OR 'neurolysis'/exp OR neurolysis OR 'neurectomy'/exp OR neurectomy) AND ('hysterectomy'/exp OR hysterectomy)
Cochrane Central Register of Controlled Trials (CENTRAL) Title Abstract Keyword: (superior hypogastric plexus OR SHP OR presacral plexus OR presacral nerve) AND (block OR neurolysis OR neurectomy) AND (hysterectomy)

Supplemental Table 2. Quality assessment according to the Newcastle-Ottawa scale for cohort studies

	Selection				Comparability		Outcome			
Items	Representativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	The study controls for demographics	The study controls for randomization	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow-up of cohorts	Overall score
Aytuluk et al.[8]	*	*	*	*	*		*	*	*	8/9