General Anesthesia

Subjects: Anesthesiology

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Vertebral lumbar surgery can be performed under both general anesthesia (GA) and spinal anesthesia. A clear benefit from spinal anesthesia (SA) remains unproven.

general anesthesia spinal anesthesia

1. Introduction

Vertebral lumbar surgery can be performed under both general anesthesia (GA) and spinal anesthesia (SA). Each has possible advantages and complications in the perioperative period [1]. In particular, SA does not require airway device placement for intraoperative sedation and analgesia; however, it could be associated with patient discomfort and intraoperative patient movements [2]. Moreover, fear of neuraxial damage caused by either local anesthetic toxicity or direct damage with an associated prolonged hospital length of stay (LOS) may discourage its use [3].

According to a systematic review and meta-analysis published in 2016 [4], patients undergoing lumbar spine surgery under SA required less analgesia in post-anesthesia care units and had less nausea and vomiting (PONV) in the first postoperative day, but no difference in intraoperative hypotension, bradycardia, blood loss, and surgical time was reported.

Given the above, a clear benefit from SA during lumbar spine surgery remains unproven. Furthermore, relevant clinical outcomes remain unexplored.

2. Study Selection and Data Retrieval

Bibliographic search results are shown in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram (Figure 1). Notably, three RCTs did not report quantitative data. Two papers were excluded because, despite our best efforts, we were not able to retrieve the full text [5][6], in one case [7] the paper did not contain any variable of interest and the authors were not able to provide any missing information.

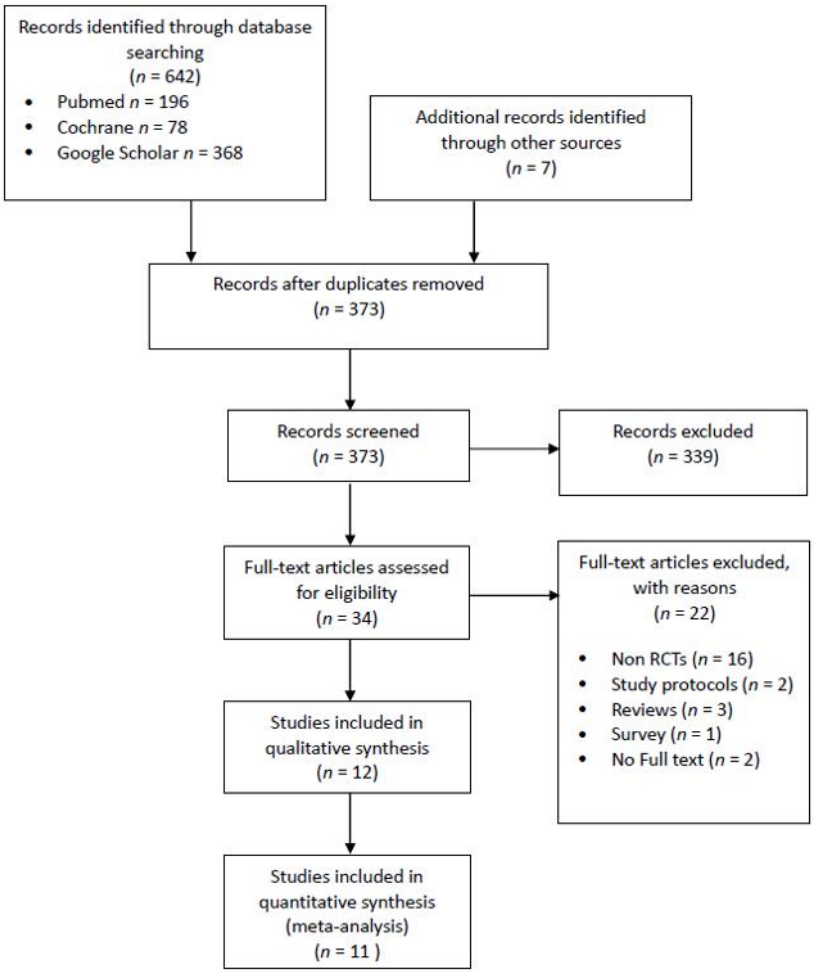

Figure 1. The PRISMA flowchart.

Eleven studies counting a total of 896 patients entered the quantitative and qualitative analysis [8][9][10][11][12][13][14][15][16][17][18]. All controversies were solved by discussion and the third reviewer was not required.

We asked all the corresponding authors for missing data, and five of them replied to our query. Only two of them, nevertheless, provided part of the missing data required [10][11][12][13][14][15][16][17][18].

Additional records were identified by checking the reference lists of included studies.

3. Study Characteristics

Among the 896 patients, half (449; 50.12%) underwent GA, while the remainder underwent SA (447; 49.88%). The characteristics of included studies are shown in Table 1 and Table S2.

Table 1. Study characteristics.

Study	N (% F)	Inclusion Criteria			Protocols			Surgery	Time to Pain Assessment
		Age	ASA-PS	BMI (Kg/m^2)	SA	GA	PO Therapy		
Attari (2011) [8]	72 (46%)	18–60	I–II	NR	3.0–3.2 mL Hyperbaric Bupivacaine 0.5% + 25 mcg Fentanyl	- Induction: propofol, lidocaine, fentanyl, atracurium - Maintenance: isoflurane 1,2%, N_20 50%	Pethidine 0.4 mg/kg on VAS (rescue pethidine 0.2 mg/kg).	Laminectomy, Discectomy	NR
Baenziger (2020) [15]	100 (46%)	Adult	I–III	NR	3.0–4.0 mL Hyperbaric Bupivacaine 0.5% + 25 mcg Fentanyl	- Induction: propofol, fentanyl, atracurium - Maintenance: Propofol TCI, Remifentanil TCI	NR	Laminectomy, Discectomy	3 h
Chowdhury (2010) [9]	80 (38%)	Adult	I–II	NR	2.5–2.8 mL Hyperbaric Bupivacaine 0.5% + 12.5 mcg Fentanyl	- Induction: propofol, fentanyl, rocuronium	Pethedine 2 mg/kg six hourly and on request.	Discectomy	6 h

						- Maintenance: halothane 0.8%, N_20 60%			
Hussain (2015) [10]	60 (50%)	20–50	I–II	NR	2 mL Bupivacaine 0.75%	- Induction: propofol, atracurium - Maintenance: sevoflurane 1.5–2%, nalbuphine	NR	Micro-discectomy	Peak at 6 h
Jellish (1996) [11]	122 (46%)	Adult	I–III	NR	1.5 mL Hyperbaric Bupivacaine 0.75%	- Induction: thiopental, fentanyl, vecuronium - Maintenance: isoflurane, N_2O 70%	PACU: morphine 2 mg IV ward:meperidine 25–50 mg IV or 50–100 mg intramuscularly.	Laminectomy, Discectomy	Peak
Kahveci (2014) [12]	80 (38%)	≥18	I–II	≤25	3 mL Hyperbaric Bupivacaine 0.5%	- Induction: propofol, fentanyl, atracurium - Maintenance: sevoflurane	Pethedine 25 mg IV on VAS.	Single-level spinal surgery	NR

						1.5–2%, atracurium			
Kara (2011) [15]	60 (45%)	Adult	I–II	NR	2 mL Levobupivacaine 0.5%	- Induction: propofol, fentanyl, rocuronium - Maintenance: desflurane 6%, N_2O 40–60%	Morphine 2 mg on VAS.	Discectomy	Peak
Kilic (2019) [17]	111 (45%)	18–65	I–III	NR	3 mL Hyperbaric Bupivacaine 0.5%	- Induction: propofol, fentanyl, rocuronium - Maintenance: sevoflurane 1.5–2%, remifentanil	NR	Micro-discectomy	3 h
Sadrolsadat (2009) [13]	100 (-)	Adult	I–III	NR	4 mL Bupivacaine 0.5%	- Induction: propofol, fentanyl, atracurium - Maintenance: propofol,	Pethedine 25 mg IV on VAS (lock 30 min in PACU and 4 h in ward).	Laminectomy	NR

					alfentanil, atracurium			
Vural (2014) [14]	66 (-)	23–74	ND	NR	4 mL Hyperbaric Bupivacaine 0.5%	- Induction: thiopental, fentanyl, rocuronium - Maintenance: desflurane 5–6%, N_2O 40–60%,fentanyl	NR	Disc herniation surgery	6 h
Yildirim Güçlü (2014) [18]	56 (-)	18–60	I–II	≤35	3 mL Hyperbaric Bupivacaine 0.5%	- Induction: thiopental, fentanyl, vecuronium - Maintenance: desflurane 4–5%, N_2O 50%, remifentanil	Pethidine 0.5 mg/kg on VAS (Rescue pethidine 0.2 mg/kg).	Micro-discectomy	NR

ASA-PS: ASA Physical Status, F: females, GA: General Anesthesia, SA: Spinal Anesthesia, PACU: Post-Anesthesia Care Unit, PO: Post-Operative, NR: Not Reported.

There were concerns of bias in ten studies, where one study was evaluated at high risk of bias [17] (Figure 2).

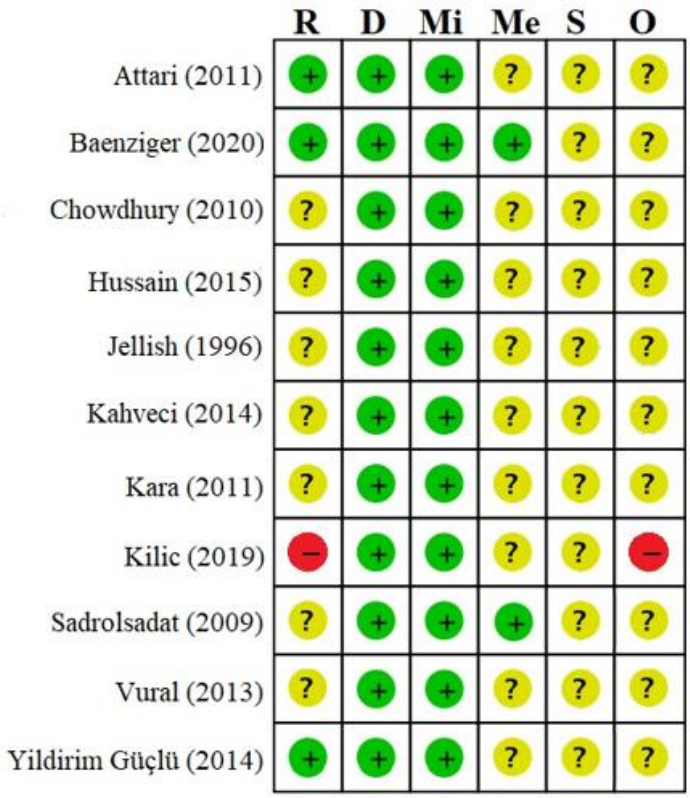

Figure 2. Summary of bias evaluated by the Risk of Bias 2 Tool. R: Bias arising from the randomization process, D: Bias due to deviations from intended interventions, Mi: Bias due to missing outcome data, Me: Bias in measurement of the outcome, S: Bias in the selection of the reported result, and O: Overall risk of bias. Green "+": Low risk of bias, Yellow "?": Some concerns, Red "-": High risk of bias.

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