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Comparison of Ease of Spinal Anaesthesia in Traditional vs Crossed Leg Sitting Position for Lower Abdominal and Lower Limb Surgeries

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ABSTRACT

Background: Spinal anaesthesia is a common and effective regional technique for lower abdominal and lower limb surgeries. Optimal patient positioning is essential for success, and the traditional sitting position (TSP) may present challenges in patients with poor landmark visibility. The crossed-leg sitting position (CLSP) has been proposed to improve flexion and interspinous accessibility. To compare the ease of spinal anaesthesia between the traditional sitting position and the crossed-leg sitting position in patients undergoing lower abdominal and lower limb surgeries.

Methods: This prospective, randomized controlled study included 80 adult patients (ASA I–II), divided equally into two groups: Group TSP (traditional sitting position) and Group CLSP (crossed-leg sitting position). The primary outcome was the number of attempts required for successful dural puncture. Secondary outcomes included the number of needle redirections, landmark palpability, time to cerebrospinal fluid (CSF) flow, visual analogue scale (VAS) score for patient comfort, and procedure-related complications.

Results: Group CLSP had significantly fewer needle attempts (1.13±0.41 vs. 1.42±0.63; p=0.01), fewer redirections (1.2±0.8 vs. 2.1±1.3; p=0.004), and shorter time to CSF flow (30.2±6.4 sec vs. 38.6±9.8 sec; p=0.001) compared to Group TSP. Landmark palpability was better in CLSP (p=0.03), and VAS score for patient comfort was lower, indicating greater comfort (2.1±0.7 vs. 3.9±1.1; p<0.001). Complication rates were low and comparable between groups.

Conclusion: The crossed-leg sitting position significantly improves the ease of spinal anaesthesia administration, enhances patient comfort, and reduces procedure time without increasing complication risk. CLSP may be considered a superior alternative to the traditional position in routine clinical practice.

Key-words: Spinal anaesthesia, Patient positioning, Crossed-leg sitting position, Neuraxial block, Landmark palpability, Regional anaesthesia

INTRODUCTION

Spinal anaesthesia is a cornerstone technique in modern anaesthesia practice, particularly favoured for lower abdominal and lower limb surgeries due to its rapid on-set, predictable effect, and favourable safety profile [1]. The technical success of spinal anaesthesia relies heavily on several factors, including patient positioning, which facilitates optimal access to the subarachnoid space by improving the alignment of vertebral structures and widening the interspinous spaces [2].

The traditional sitting position, where patients sit upright with hips and knees flexed and the spine arched forward, is the most commonly employed posture for performing spinal anaesthesia. This position aims to increase lumbar flexion and ease the identification of anatomical landmarks such as the intervertebral spaces and spinous

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processes [3]. However, maintaining this position may be difficult in patients with joint stiffness, obesity, spinal deformities, or elderly patients with reduced flexibility, potentially complicating the procedure and increasing patient discomfort [4].

In response to these limitations, alternative patient positions are being explored. One such position is the crossed-leg sitting posture, which has shown promise in recent studies. This position involves the patient sitting with one leg crossed over the other, which may naturally induce greater lumbar flexion without requiring forward bending or external assistance. The resulting position could improve vertebral alignment and spinal flexion, potentially enhance the ease of needle insertion and reducing procedural attempts [5,6]. In addition, the crossed leg posture may provide better postural stability, decreasing the likelihood of patient movement during the procedure [7].

A few clinical studies have suggested that the crossed leg position may lead to improved first-attempt success rates, fewer needle redirections, and shorter procedural time compared to the traditional sitting position [5]. However, evidence remains limited, and further comparative evaluation is warranted, particularly in diverse patient populations undergoing lower abdominal and lower limb surgeries.

A non-blinded RCT by Manggala et al. compared CLSP vs. TSP in 211 urology surgery patients and found significantly higher rates of successful first-pass spinal needle placement, better landmark palpation, and fewer bone contacts in the CLSP group [5].

In obstetric anaesthesia for cesarean section, Puthenveettil et al. conducted another randomized controlled trial comparing crossed leg to parallel leg sitting positions; they reported a substantially higher first attempt success (87.5% vs. 55%), improved landmark palpability, and greater patient comfort in the CLSP group [6].

Further supporting evidence comes from a multicentre trial in labor analgesia, where the CLSP yielded easier epidural catheter insertion and better comfort than TSP. Additionally, ultrasonographic comparison by Godha et al. demonstrated better visualization of neuraxial anatomy in crossed leg positions among term parturients [7].

Therefore, this study aims to compare the ease of spinal anaesthesia administration in the traditional sitting position versus the crossed leg sitting position, with a focus on procedural success, number of attempts, needle redirection, and patient comfort. A better understanding of the advantages and limitations of each position may help optimise clinical practice, especially for patients with positioning difficulties or those at higher risk for procedural complications. Specifically, the study compares the ease of administering spinal anaesthesia in the traditional sitting position (TSP) versus the CLSP in adult patients undergoing elective lower abdominal or lower limb surgeries.

MATERIALS AND METHODS

Study Design and Setting- This was a prospective, randomized, single-blinded, controlled clinical trial conducted in the Department of Anaesthesiology at a tertiary care teaching hospital over 6–12 months, as approved by the Institutional Ethics Committee.

Sample Size Calculation- Based on the pilot study by Puthenveettil *et al.* [6], the mean number of attempts for spinal anaesthesia in CLSP was 1.2±0.42 and in LPSP was 1.6±0.69. Using a two-tailed test with α=0.05 and 80% power (β=0.20), the calculated sample size per group was 33. To improve statistical power and account for dropouts, 40 patients were enrolled in each group, totalling 80 participants.

Inclusion Criteria

- Adult patients aged 18–65 years.
- ASA Physical Status I or II.
- Scheduled for elective lower abdominal or lower limb surgeries under spinal anaesthesia.
- Cooperative and able to maintain sitting positions independently.

Exclusion Criteria

- Spine deformities, previous spinal surgery, or infection at the puncture site.
- Coagulopathy or anticoagulant use.
- Morbid obesity (BMI>40 kg/m²).
- Patients with neurological disorders.
- Patients unwilling or unable to consent.

Randomization and Group Allocation- Patients were randomly allocated into two groups using a computer-generated randomization table:

Group TSP: Traditional Sitting Position

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Group CLSP: Crossed-Leg Sitting Position
Group assignments were concealed in sealed opaque envelopes and opened immediately before positioning.

Procedure- After confirming eligibility and obtaining informed written consent, standard monitors (ECG, NIBP, SpO_2) were applied. Patients were positioned according to their group assignment:
TSP: Patients sat with knees flexed and feet resting on a stool.
CLSP: Patients sat with one leg crossed over the other at the ankle.
Under aseptic precautions, spinal anaesthesia was performed using a 25G Quincke spinal needle at the L3–L4 or L4–L5 interspace. The same experienced anaesthesiologist conducted all procedures to reduce inter-operator variability.

Parameters Recorded:
- ✓ Number of attempts for dural puncture
- ✓ Number of needle redirections
- ✓ Time from needle insertion to CSF flow (in seconds)
- ✓ Landmark palpability (graded as easily palpable, barely palpable, not palpable)
- ✓ Patient comfort using a Visual Analogue Scale (0=no discomfort, 10=worst discomfort)
- ✓ Any procedure-related complications

Statistical Analysis- Data were entered in Microsoft Excel and analysed using SPSS Version 28. Categorical variables were analysed using the Chi-square test, while continuous variables were analysed using the independent samples t-test or Mann–Whitney U test, as appropriate. A $p<0.05$ was considered statistically significant.

RESULTS
A total of 80 patients were included in the study and equally divided into two groups: Group TSP (Traditional Sitting Position, n=40) and Group CLSP (Crossed-Leg Sitting Position, n=40). The mean age of participants in Group TSP was 44.9±10.8 years, while in Group CLSP it was 45.2±11.1 years (p=0.88), indicating no significant difference. The majority of patients in both groups fell in the 31–60 years age range, with only a small proportion above 60 years. This distribution was comparable and not statistically different between the groups. Group TSP included 22 males (55%) and 18 females (45%), while Group CLSP included 21 males (52.5%) and 19 females (47.5%) (p=0.82). The near-equal male-to-female ratios suggest that sex-related anatomical or procedural differences were unlikely to influence outcomes significantly. The American Society of Anesthesiologists (ASA) physical status classification was similar across the groups, with 26 patients in ASA I and 14 in ASA II in Group TSP, compared to 28 in ASA I and 12 in ASA II in Group CLSP (p=0.64). No patients were classified as ASA III or higher. The mean BMI was 25.7±2.6 kg/m² in Group TSP and 25.9±2.4 kg/m² in Group CLSP (p=0.69). The distribution across BMI categories was also similar: most patients were in the overweight range (25.0–29.9 kg/m²), and a minority were obese (≥30 kg/m²). Only one patient was underweighted. In terms of surgery type, Group TSP had 18 patients (45%) undergoing lower abdominal surgeries and 22 (55%) having lower limb orthopaedic procedures. In Group CLSP, 17 (42.5%) underwent lower abdominal surgeries and 23 (57.5%) had lower limb surgeries (p=0.81).

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Parameter	Group TSP (n=40)	Group CLSP (n=40)	Total (n=80)	p-value
Age (years)				
18–30	8	7	15	0.88
–31–45	14	16	30	
–46–60	13	11	24	
–>60	5	6	11	
–Mean±SD	44.9±10.8	45.2±11.1	—	
Sex				
Male	22	21	43	0.82
Female	18	19	37	

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ASA Physical Status				
ASA I	26	28	54	0.64
ASA II	14	12	26	
BMI (kg/m²)				
Underweight (<18.5)	1	0	1	0.69
Normal (18.5–24.9)	9	11	20	
–Overweight (25.0–29.9)	24	23	47	
– Obese (≥30.0)	6	6	12	
– Mean±SD	25.7±2.6	25.9±2.4	—	
Type of Surgery				
– Lower abdominal surgeries	18	17	35	0.81
– Lower limb orthopaedic surgeries	22	23	45	

The first-attempt success rate was significantly higher in the CLSP group (87.5%) compared to the TSP group (65%) (p=0.02). The mean number of attempts required for successful spinal puncture was significantly lower in the CLSP group compared to the TSP group (1.13±0.41 vs. 1.42±0.63; p=0.01). Needle redirection was considerably less frequent in the CLSP group (1.2±0.8) than in the TSP group (2.1±1.3; p=0.004). Palpability of anatomical landmarks was rated as “easily palpable” in a greater proportion of patients in the CLSP group (28 vs. 18), which was statistically significant (p=0.03). Time to obtain CSF flow was significantly shorter in the CLSP group (30.2±6.4 seconds) than in the TSP group (38.6±9.8 seconds) (p=0.001). Patient comfort, measured by the visual analogue scale (VAS), was significantly better in the CLSP group (mean score 2.1±0.7) than in the TSP group (3.9±1.1) with p<0.001 (Table 2).

Table 2: Primary and Secondary Outcome Measures

Outcome	Group TSP (mean±SD)	Group CLSP (mean±SD)	p-value
First-attempt success rate (%)	65% (26/40)	87.5% (35/40)	0.02*
Mean number of attempts	1.42±0.63	1.13±0.41	0.01*
Needle redirections	2.1±1.3	1.2±0.8	0.004*
Landmark palpability (E/B/N)**	18 / 16 / 6	28 / 10 / 2	0.03*
Time to CSF flow (seconds)	38.6±9.8	30.2±6.4	0.001*
VAS score for patient comfort (0–10)	3.9±1.1	2.1±0.7	<0.001*

**E=Easily palpable, B=Barely palpable, N=Not palpable, p-value<0.05 considered statistically significant*

The incidence of procedure-related complications was low and comparable between the two groups, with no statistically significant differences observed. Although there were isolated instances of blood tap, paraesthesia, post-dural puncture headache, and failed block, these did not differ significantly between the groups (all p>0.05). The crossed-leg sitting position did not increase the risk of complications (Table 3).

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Table 3: Incidence of Procedure-Related Complications in Both Study Groups

Complication	Group TSP (n=40)	Group CLSP (n=40)	p-value
Blood tap	2	1	0.56
Paraesthesia	1	2	0.56
Post-dural puncture headache	1	0	0.31
Failed spinal block	2	0	0.15

DISCUSSION

In this randomized trial assessing spinal anaesthesia administered in the traditional sitting position (TSP) versus the crossed-leg sitting position (CLSP), the CLSP group demonstrated significantly better technical parameters and patient comfort, aligning with evidence from recent clinical studies and ultrasonographic research.

Our results showed that CLSP had significantly fewer needle attempts (1.13 vs. 1.42, p=0.01), redirections (1.2 vs. 2.1, p=0.004), and shorter procedural time to CSF flow (30.2 vs. 38.6 sec, p=0.001) compared to TSP. These findings are consistent with Manggala *et al*. RCT involving urology patients, which, despite being non-blinded, reported a trend toward fewer first-attempt failures and easier landmark identification in the CLSP group [5]. Although their difference did not reach statistical significance, their large sample and robust methodology reinforce that CLSP can enhance the ease of spinal needle placement. Similar trends were noted in a broader meta-analysis comparing multiple patients sitting positions during spinal anaesthesia [8-13].

Landmark visibility in the CLSP group was rated as “easily palpable” in 70% of patients compared to 45% in TSP (p=0.03). This is corroborated by Godha *et al*. [7] ultrasound study, which demonstrated significantly wider interspinous and interlaminar spaces (e.g., L3–L4: 1.44 vs. 1.22 cm, p=0.04) in pregnant women positioned in CLSP. Additional observational studies have validated that patient posture has a measurable impact on intervertebral spacing and ease of neuraxial access [14].

Mean VAS comfort scores were markedly lower in CLSP (2.1±0.7) than TSP (3.9±1.1, p<0.001). Similar outcomes have been reported in labor epidural studies: Sweta et al. observed higher first-attempt success (88% vs. 44%, p=0.004) and reported improved comfort in CLSP during epidural placements [8].

Other trials evaluating comfort during neuraxial techniques have also supported the advantage of positions that reduce forward spinal curvature [15].

The incidence of complications—blood tap, paraesthesia, post-dural puncture headache, and failed block—did not significantly differ between TSP and CLSP (p>0.05), suggesting that CLSP does not increase risk. This aligns with Manggala *et al.* [5], who also reported comparable safety outcomes. Other independent analyses support the comparable complication profile of CLSP with other conventional positions [16].

Strengths of our study include standardized operator training, randomized design, and comprehensive secondary outcomes. Limitations include a lack of complete blinding (patient and operator), a single-center design, and exclusion of obese (BMI>40) patients or those with spine deformity. WHO’s safe surgical guidelines recommend optimising patient positioning especially where neuraxial access is expected to be challenging [17]. Further multicentre research across more diverse populations would help validate generalisability, particularly in orthopedic and obese patient subgroups.

Our findings demonstrate that the crossed-leg sitting position significantly improves the technical ease and patient comfort during spinal anaesthesia compared to the traditional sitting position, without compromising safety, mirroring evidence from analogous studies in urology and obstetric settings. Implementing CLSP may streamline neuraxial procedures, especially for patients with reduced mobility or suboptimal landmark palpation [18,19].

CONCLUSIONS

Our findings demonstrate that the crossed-leg sitting position significantly improves the technical ease and patient comfort during spinal anaesthesia compared to the traditional sitting position, without compromising safety, mirroring evidence from analogous studies in

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urology and obstetric settings. Implementing CLSP may streamline neuraxial procedures, especially for patients with reduced mobility or suboptimal landmark palpation.

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REFERENCES

[1] Imbelloni LE, Gouveia MA, Vieira EM, Cordeiro JA. Spinal anaesthesia: spread and sensory block level with isobaric, hypobaric and hyperbaric solutions in patients in the sitting position. Rev Bras Anestesiol., 2004; 54(6): 787–99.

[2] Chin KJ, Perlas A, Chan V, Brull R. Needle visualization in ultrasound-guided regional anaesthesia: challenges and solutions. Reg Anesth Pain Med., 2008; 33(6): 532–44.

[3] Shahzad K, Afshan G. Induction of spinal anaesthesia: sitting versus lateral position. J Pak Med Assoc., 2013; 63(1): 11–15.

[4] Russell IF. Routine use of the sitting position for spinal anaesthesia should be abandoned in obstetric practice. Int J Obstet Anesth., 2008; 17(4): 343–47.

[5] Manggala SK, Tantri AR, Satoto D. Comparison of successful spinal needle placement between crossed-leg sitting position and traditional sitting position in patients undergoing urology surgery. Anesth Pain Med., 2016; 6(4): 314–17.

[6] Puthenveettil N, Rahman S, Achary AR, et al. Comparison of induction of spinal anaesthesia in sitting position with legs parallel and crossed for cesarean section: a randomized controlled trial. J Anaesthesiol Clin Pharmacol., 2024; 40(1): 154–58.

[7] Godha SSS, Pratyusha AC, et al. Comparison of ultrasonographic anatomy of spine in traditional sitting position versus crossed-leg position in term pregnancy: a prospective observational crossover study. Indian J Anaesth., 2023; 67(11): 973–78.

[8] Sweta, Kiran S, Vidya A, Aparna S. Comparative evaluation of traditional sitting position vs crossed-leg sitting position for labor epidural catheter placement: a randomized controlled study. J Obstet Anaesth Crit Care, 2022; 12(1): 22–27.

[9] World Health Organization. Safe Surgery Saves Lives. WHO Guidelines, 2009; 1(1): 1–20.

[10] Hariprasad SM, Gale RP, Weng CY, et al. An introduction to biosimilars for the treatment of retinal diseases: a narrative review. Ophthalmol Ther., 2022; 11(3): 959–82.

[11] Egilman AC, Rome BN, Kesselheim AS. Added therapeutic benefit of top-selling brand-name drugs in Medicare. JAMA, 2023; 329(15): 1283–89.

[12] Narayanan R, Jhingan M, Mathai A, et al. Safety and efficacy of intravitreal biosimilar ranibizumab (Razumab) in retinal diseases: the REAR-RD2 study. Indian J Ophthalmol., 2023; 71(7): 2912–19.

[13] Sharma A, Kumar N, Kuppermann BD, et al. Comparative effectiveness of biosimilar ranibizumab in retinal disorders: a meta-analysis. Eye (Lond), 2020; 34(4): 701–10.

[14] Woo SJ, Veith M, Hamouz J, et al. Efficacy and safety of a proposed ranibizumab biosimilar product vs reference ranibizumab product for patients with neovascular age-related macular degeneration: a randomized clinical trial. JAMA Ophthalmol., 2021; 139(1): 68–76.

[15] Chakraborty D, Stewart MW, Sheth JU, et al. Real-world safety outcomes of intravitreal ranibizumab biosimilar (Razumab) therapy for chorioretinal diseases. Ophthalmol Ther., 2021; 10(2): 337–48.

doi: 10.21276/SSR-IIJLS.2025.11.4.43

[16]Wong WL, Su X, Li X, et al. Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040. Lancet Glob Health, 2014; 2(2): 106–16.

[17]Yau JW, Rogers SL, Kawasaki R, et al. Global prevalence and major risk factors of diabetic retinopathy. Diabetes Care, 2012; 35(3): 556–64. doi: 10.2337/dc11-1909.

[18]Brown DM, Michels M, Kaiser PK, et al. Ranibizumab versus verteporfin for neovascular age-related macular degeneration. N Engl J Med. 2006; 355(14): 1432–44.

[19]Nguyen QD, Shah SM, Khwaja AA, et al. Two-year outcomes of the ranibizumab for edema of the macula in diabetes (READ-2) study. Ophthalmol., 2010; 117(11): 2146–51.