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A COMPARATIVE STUDY OF THE INCIDENCE OF INTRAOPERATIVE HYPOTENSION FOLLOWING SPINAL ANAESTHESIA WITH DEXMEDETOMIDINE VERSUS DEXAMETHASONE AS ADJUVANTS TO

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ABSTRACT

Background: Spinal anaesthesia is commonly used for lower-limb orthopaedic surgery, but sympathetic blockade may cause intraoperative hypotension. Intrathecal adjuvants may influence haemodynamic stability.

Aim: To compare the incidence of intraoperative hypotension following spinal anaesthesia using bupivacaine with either dexmedetomidine or dexamethasone in patients undergoing tibiofibular fracture fixation.

Methods: This prospective, randomized, double-blind study was conducted at the University College Hospital, Ibadan, over 6months. Sixty-eight adults (ASA I–II), aged 18–65 years, were randomized into two equal groups. Both groups received 15 mg of 0.5% hyperbaric bupivacaine, combined with either dexmedetomidine 5 µg (BDM) or dexamethasone 4 mg (BDA). Haemodynamic parameters were monitored intraoperatively. Hypotension was defined as systolic blood pressure below 100 mmHg or a reduction greater than 20% from baseline. Data were analysed using SPSS version 23, with statistical significance set at $p<0.05$.

Results: Hypotension occurred in 10 (29.4%) patients in the BDM group compared with 1 (2.9%) in the BDA group ($p=0.003$). Bradycardia occurred in 4 (11.8%) versus 2 (5.9%) patients ($p=0.393$), while tachycardia occurred in 3 (8.8%) versus 1 (2.9%) ($p=0.303$), respectively. These latter differences were not statistically significant.

Conclusion: Intrathecal dexmedetomidine was associated with a significantly higher incidence of intraoperative hypotension than dexamethasone. Dexamethasone may provide a more favourable haemodynamic profile, although larger studies are required to confirm this finding.

Keywords: Spinal Anaesthesia; Bupivacaine; Dexmedetomidine; Dexamethasone; Hypotension; Tibiofibular Fracture

1 INTRODUCTION

Spinal anaesthesia is a widely used anaesthetic technique for lower abdominal, pelvic, perineal and lower-limb surgical procedures.[1] Its popularity is attributable to its relatively simple administration, rapid onset, reliable sensory and motor blockade, effective intraoperative anaesthesia and provision of postoperative analgesia. In lower-limb orthopaedic surgery, it offers an effective alternative to general anaesthesia while avoiding airway instrumentation and some of the physiological disturbances associated with general anaesthesia.[2] It may also reduce perioperative anaesthetic requirements and provide satisfactory postoperative pain control.[1,2] Despite these advantages, spinal anaesthesia is associated with complications, of which hypotension is one of the most clinically important.[3] The administration of local anaesthetic into the subarachnoid space produces sympathetic blockade, resulting in vasodilatation, reduced systemic vascular resistance and venous pooling.[2] The consequent reduction in venous return and cardiac output may cause a fall in arterial blood pressure. The severity of this response depends on several factors, including the extent of sympathetic blockade, baseline cardiovascular status, intravascular volume, patient characteristics, the dose of local anaesthetic and the pharmacological properties of additional intrathecal drugs.[3,4]

Intraoperative hypotension is clinically relevant because sustained reductions in arterial pressure may compromise tissue perfusion and oxygen delivery. The consequences may be particularly important in patients with limited cardiovascular reserve or pre-existing organ dysfunction.[5] Even in otherwise healthy patients, hypotension may produce symptoms such as dizziness, nausea and weakness, and may require prompt intervention with intravenous fluids and vasopressors. Consequently, the prevention, early recognition and appropriate treatment of hypotension remain important components of safe spinal anaesthesia. Hyperbaric bupivacaine is frequently used for subarachnoid block because of its predictable sensory and motor blockade and suitable duration of action for many infraumbilical and lower-limb procedures. However, its duration may be insufficient to provide prolonged postoperative analgesia. Consequently, several adjuvant drugs have been investigated to improve block characteristics, prolong analgesia and reduce postoperative analgesic requirements. These include opioids, alpha-2 adrenergic agonists, corticosteroids and other pharmacological agents.[4,5,6]

Dexmedetomidine is a highly selective alpha-2 adrenergic receptor agonist with sedative, anxiolytic, sympatholytic and analgesic properties. Its analgesic effects are mediated partly through modulation of nociceptive transmission in the spinal cord. When administered as an adjuvant to intrathecal bupivacaine, dexmedetomidine has been associated with faster onset of sensory blockade, prolonged duration of sensory and motor blockade, and improved postoperative analgesia.[5,6] However, the sympatholytic properties of dexmedetomidine may also influence cardiovascular function. Activation of central alpha-2 adrenergic receptors reduces sympathetic outflow and circulating catecholamine activity.[6] This may result in reduced heart rate and arterial blood pressure. Although these effects may be beneficial in selected clinical circumstances, they raise concerns about the possibility of clinically significant hypotension and bradycardia when dexmedetomidine is used during spinal anaesthesia.[7]

Dexamethasone, in contrast, is a potent synthetic glucocorticoid with anti-inflammatory and analgesic properties. It is believed to prolong the effects of local anaesthetics through mechanisms involving suppression of inflammatory mediators, inhibition of nociceptive C-fibre transmission and reduction of ectopic neuronal discharge.8 Dexamethasone has been used as an adjuvant to local anaesthetics in different regional anaesthetic techniques and has demonstrated potential to prolong analgesia.[8,9] Its pharmacological profile differs from that of dexmedetomidine, particularly with respect to its direct sympatholytic effects.

Comparative studies have investigated dexmedetomidine and dexamethasone as adjuvants to bupivacaine in different surgical procedures. Several have demonstrated improved analgesia with dexmedetomidine, while others have reported variable differences in the incidence of haemodynamic adverse events. Elshahawy and colleagues[10] compared dexmedetomidine and dexamethasone as adjuvants to intrathecal bupivacaine in emergency lower-limb orthopaedic surgery and reported differences in block characteristics, although their findings regarding adverse effects were not identical to those of the present study.[10] Studies of intrathecal dexmedetomidine have also identified hypotension and bradycardia as relevant adverse events, with the incidence potentially influenced by dose and patient characteristics.[11] Although the analgesic benefits of intrathecal adjuvants have received considerable attention, their comparative haemodynamic effects remain important in selecting an appropriate drug for individual patients. This is particularly relevant in resource-constrained settings where the availability of continuous haemodynamic monitoring, vasopressors and advanced perioperative support may vary.

The study focuses on the incidence of intraoperative hypotension following spinal anaesthesia with bupivacaine-dexmedetomidine compared with bupivacaine-dexamethasone. It also examines the available demographic and clinical information in relation to the observed haemodynamic outcomes. The study therefore aims to compare the incidence of intraoperative hypotension following spinal anaesthesia using hyperbaric bupivacaine with either dexmedetomidine or dexamethasone as an intrathecal adjuvant in patients undergoing untilateral tibiofibular fracture fixation.

2 METHODOLOGY

2.1 Study design and setting

This was a prospective, randomized, double-blind comparative study conducted at the Department of Anaesthesia, University College Hospital, Ibadan, Nigeria. The study involved adult patients scheduled for unilateral fixation of tibiofibular fractures under subarachnoid block. Recruitment and data collection took place over six months.

2.2 Study population

The study population consisted of adult patients undergoing unilateral tibiofibular fracture fixation under spinal anaesthesia.

Patients were eligible if they were aged between 18 and 65 years, had an ASA physical status of I or II, were scheduled for unilateral tibiofibular fracture fixation under subarachnoid block and provided written informed consent.

Patients were excluded if they declined consent, were younger than 18 years or older than 65 years, had an ASA physical status greater than II, had contraindications to spinal anaesthesia, had known allergy to any of the study drugs, had cognitive impairment, were receiving long-term analgesics for chronic pain, were receiving anticoagulants or were expected to undergo surgery lasting more than 120 minutes.

2.3 Sample size determination

The sample size was calculated using the Kirkwood formula for comparing two groups.

The sample size for this study was calculated using the formula (Kirkwood formula for more than one group).

- $ni = \delta 2(Z(1-\alpha/2) + Z(1-\beta))2\ \Delta 2$
- $\delta = 193.10 – 54.3$ min
- $\delta = 138.8$
- Δ = assumed clinical difference and aim at reducing the time deviation for the requirement of postoperative analgesia by 50%
- $\Delta = 138.8/2$
- $\Delta = 69.4$
- Therefore, $n = (138.8)^2\ (1.96 + 0.84)^2$
    - $(69.4)^2 = 151,0414816 = 31.36$
- With 10% attrition = 3
- $n = 31 + 3.\ n = 34$

For each group, the study considered a minimum sample size of 34.

The study sample size for the two (2) groups = 68

The estimated minimum sample size was 31 participants per group. An additional 10% was included to account for possible attrition, giving a final sample size of 34 participants in each group and a total of 68 participants.

2.4 Ethical considerations

Ethical approval was obtained from the Joint Local Ethical Review Committee of the University College Hospital and the University of Ibadan, through the Institute for Advanced Medical Research and Training. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Written informed consent was obtained from all participants after the study procedures had been explained in a language they understood. Participation was voluntary, and refusal or withdrawal did not affect the standard of care received.

2.5 Recruitment and randomization

Seventy-eight patients scheduled for unilateral tibiofibular fracture fixation were approached for participation. Ten declined consents, leaving 68 participants who were recruited and randomized into two equal groups of 34 patients each.

Block randomization was performed using a computer-generated table of random numbers. The theatre pharmacist prepared and retained the randomization codes until completion of the study. Consecutive participants were allocated to either the bupivacaine-dexmedetomidine group (BDM) or the bupivacaine-dexamethasone group (BDA).

2.6 Study interventions and blinding

The study medications were prepared by the theatre pharmacist and made indistinguishable in appearance and volume to maintain blinding of the investigator and participants.

Participants in Group BDM received 15 mg (3 ml) of 0.5% hyperbaric bupivacaine combined with 5 µg of dexmedetomidine in 1 ml. Participants in Group BDA received 15 mg (3 ml) of 0.5% hyperbaric bupivacaine combined with 4 mg of dexamethasone in 1 ml. The total intrathecal volume in each group was 4 ml.

2.7 Preoperative preparation

All participants underwent preoperative assessment, including medical history, physical examination and review of relevant investigations. The patients were educated on the Numerical Rating Scale (NRS), where zero represented no pain and 10 represented the worst imaginable pain.

Patients observed the recommended fasting guidelines, with a minimum of six hours for solid food and two hours for clear fluids.

2.8 Anaesthetic technique and intraoperative monitoring

On arrival in the operating theatre, standard monitoring was instituted, including non-invasive blood pressure monitoring, electrocardiography and pulse oximetry. Baseline pulse rate, blood pressure, mean arterial pressure, respiratory rate and peripheral oxygen saturation were recorded. Intravenous access was established using a 16G or 18G cannula, and all patients received a preload of 0.9% normal saline at 15 ml/kg. Spinal anaesthesia was performed with the patient in the sitting position. The L3–L4 or L4–L5 interspace was identified using anatomical landmarks. Following aseptic preparation and local infiltration with 2 ml of 1% plain lidocaine, a 25G Whitacre pencil-point spinal needle was introduced into the subarachnoid space. After confirmation of free cerebrospinal fluid flow, the allocated 4 ml study solution was injected intrathecally. Patients were immediately returned to the supine position. Sensory blockade was assessed using loss of sensation to cold along the mid-clavicular line bilaterally. Motor blockade was assessed using the Modified Bromage scale.

Blood pressure, pulse rate, mean arterial pressure, respiratory rate and oxygen saturation were monitored immediately after spinal injection, every two minutes for the first 15 minutes and subsequently every 10 minutes until the end of surgery.

2.9 Definition and management of intraoperative hypotension

Intraoperative hypotension was defined as systolic blood pressure below 100 mmHg or a reduction greater than 20% from the baseline value. Patients who developed hypotension were treated with intravenous ephedrine 5 mg boluses, intravenous fluids and blood when clinically indicated. Bradycardia was defined as heart rate below 60 beats per minute and was managed with intravenous atropine 0.02 mg/kg. Respiratory depression was defined as respiratory rate below eight breaths per minute or peripheral oxygen saturation below 90%.

2.10 Outcome measures

- The primary outcome was the incidence of intraoperative hypotension in the two study groups.
- Secondary haemodynamic outcomes included:
- Incidence of intraoperative bradycardia.
- Incidence of intraoperative tachycardia.
- Comparison of recorded intraoperative haemodynamic variables.
- Incidence of intraoperative adverse events, including hypoxia, nausea, vomiting, shivering and deep sedation.

2.11 Statistical analysis

Data were coded and analysed using IBM Statistical Package for Social Sciences (SPSS), version 27. Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. Independent Student's t-test was used to compare continuous variables between the two groups. Chi-square or Fisher's exact test was used for categorical variables, as appropriate. Statistical significance was set at $p<0.05$. The crude risk ratio and absolute risk difference for hypotension were calculated from the group frequencies.

3 RESULTS

A total of 78 patients scheduled for unilateral tibiofibular fracture fixation were approached for the study. Ten patients declined consent. The remaining 68 patients were randomized into two equal groups: 34 received bupivacaine-dexmedetomidine (BDM), while 34 received bupivacaine-dexamethasone (BDA). All 68 participants completed the study, and their data were included in the analysis.

Table I shows the baseline characteristics of participants, which were comparable between the two groups. The mean age was 43.8 ± 11.7 years in Group BDM and 45.8 ± 9.9 years in Group BDA (p=0.443). The mean body weight was 73.3 ± 6.7 kg in Group BDM and 75.8 ± 8.3 kg in Group BDA (p=0.170). Males were more, constituting 73.5% of Group BDM and 85.3% of Group BDA. Most participants were classified as ASA physical status I.

Table 1: Baseline demographic and clinical characteristics

Variable	BDM (n=34)	BDA (n=34)	p-value
Age (years), mean ± SD	43.8 ± 11.7	45.8 ± 9.9	0.443
Weight (kg), mean ± SD	73.3 ± 6.7	75.8 ± 8.3	0.170
Male, n (%)	25 (73.5)	29 (85.3)	0.230
Female, n (%)	9 (26.5)	5 (14.7)	
ASA I, n (%)	23 (67.6)	25 (73.5)	0.595
ASA II, n (%)	11 (32.4)	9 (26.5)	
Duration of surgery (min), mean ± SD	98.9 ± 10.4	99.9 ± 8.3	0.654

BDM: bupivacaine-dexmedetomidine; BDA: bupivacaine-dexamethasone; SD: standard deviation; ASA: American Society of Anesthesiologists.

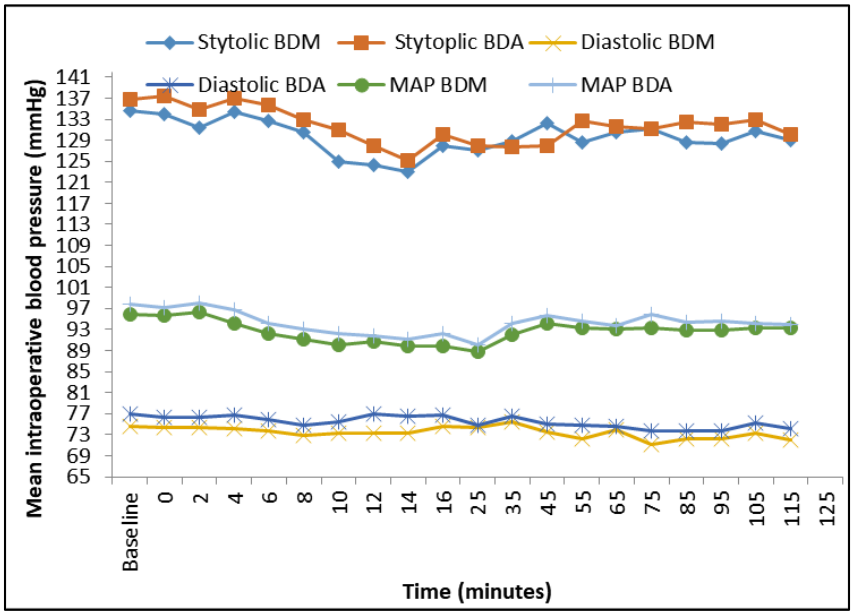


Figure 1: depicts Intraoperative mean systolic blood pressure, mean diastolic blood pressure and mean arterial blood pressure in the bupivacaine/dexmedetomidine (BDM) and bupivacaine/dexamethasone (BDA) groups. Hypotension was recorded in 10 patients (29.4%) in group BDM and 1 patient (2.9%) in group BDA, *p* = 0.003. This difference was statistically significant

Table II: shows the incidence of intraoperative hypotension, the absolute difference in hypotension incidence was 26.5 percentage points, the crude risk ratio was 10.0, indicating that the observed risk of hypotension was ten times higher in the dexmedetomidine group than in the dexamethasone group. (Table II)

Table 2: Incidence of intraoperative hypotension

Outcome	BDM (n=34)	BDA (n=34)	p-value
Hypotension, n (%)	10 (29.4)	1 (2.9)	0.003
No hypotension, n (%)	24 (70.6)	33 (97.1)	
Absolute risk difference	26.5 percentage points		
Crude risk ratio	10.0		

BDM: bupivacaine-dexmedetomidine; BDA: bupivacaine-dexamethasone.

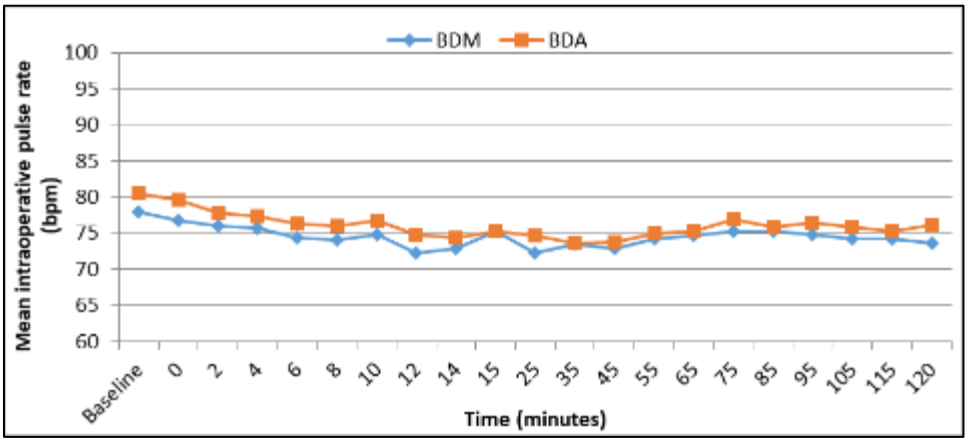


Figure 2: Intraoperative mean pulse rate (PR) in the bupivacaine/dexmedetomidine (BDM) and bupivacaine/dexamethasone (BDA) groups, four patients (11.8%) in Group BDM developed bradycardia compared with two patients (5.9%) in Group BDA. The difference was not statistically significant (p=0.393). Tachycardia occurred in three patients (8.8%) in Group BDM and one patient (2.9%) in Group BDA (p=0.303). Although the numerical incidence of both bradycardia and tachycardia was higher in the dexmedetomidine group, these differences were not statistically significant.

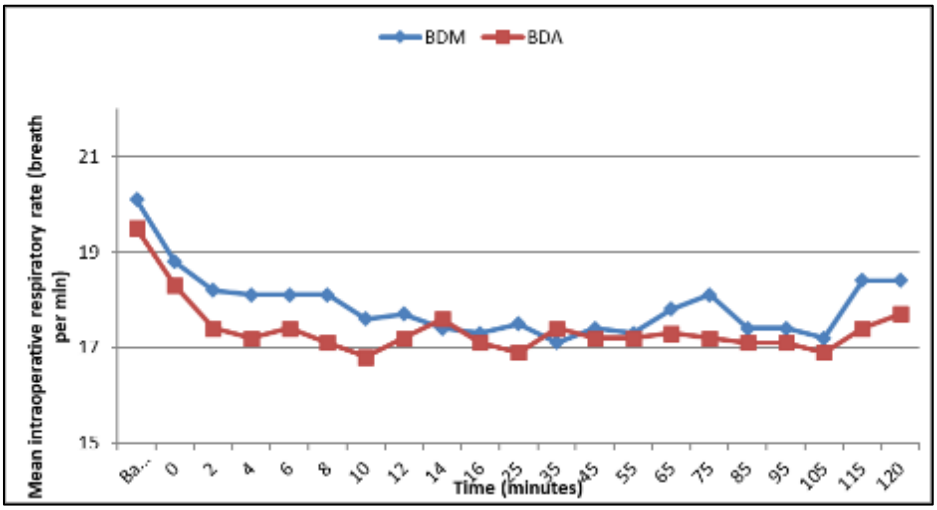


Figure 3: Depicts Intraoperative mean respiratory rate (RR) in the bupivacaine/dexmedetomidine (BDM) and bupivacaine/dexamethasone (BDA) groups, values were comparable in both groups.

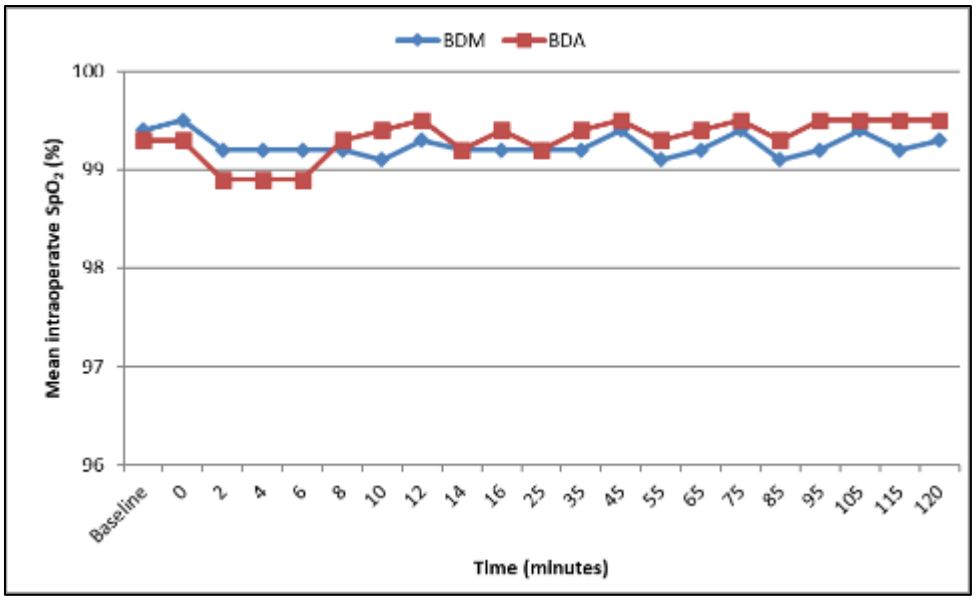


Figure 4: Intraoperative mean SpO_2 in the bupivacaine/dexmedetomidine (BDM) and bupivacaine/dexamethasone (BDA) groups, values were comparable in both groups.

Table 3: Side effects between the bupivacaine/dexmedetomidine and bupivacaine/dexamethasone groups there were no reports of post-operative hypoxia, deep sedation, nausea and vomiting or shivering in either group BDM or group BDA.

Side effects	Items	Group BDM n (%)	Group BDA n (%)	total	χ^2	p-value
Sedation	Yes	0	0	0	NA	NA
	No	34(100)	34(100)	68		
Vomiting	Yes	0	0	0	NA	NA
	No	34(100)	34(100)	68		
Shivering	Yes	0	0	0	NA	NA
	No	34(100)	34(100)	68		
Nausea	Yes	0	0	0	NA	NA
	No	34(100)	34(100)	68		
Hypoxia	Yes	0	0	0	NA	NA
	No	34(100)	34(100)	68		

4 DISCUSSION

This study compared the incidence of intraoperative hypotension following spinal anaesthesia using hyperbaric bupivacaine with either dexmedetomidine or dexamethasone in patients undergoing unilateral tibiofibular fracture fixation. The most important finding was that patients who received dexmedetomidine experienced a significantly higher incidence of intraoperative hypotension than those who received dexamethasone. Hypotension occurred in 29.4% of patients in the dexmedetomidine group compared with 2.9% in the dexamethasone group. This finding is clinically relevant because hypotension is a recognized consequence of spinal anaesthesia and may be influenced by the pharmacological properties of intrathecal adjuvants. Although dexmedetomidine may improve the quality and duration of spinal analgesia, its sympatholytic activity may increase the likelihood of reductions in arterial pressure in susceptible patients.

The incidence of hypotension was substantially higher in the dexmedetomidine group. The observed difference was statistically significant, with a p-value of 0.003. The absolute difference of approximately 26.5 percentage points suggests a potentially important clinical difference between the two regimens. This finding is particularly important because both groups received the same dose of hyperbaric bupivacaine, the same intravenous fluid preload and the same general intraoperative monitoring protocol. The principal pharmacological difference between the groups was therefore the intrathecal adjuvant administered. Spinal anaesthesia produces sympathetic blockade, which reduces vascular tone and promotes venous pooling. The addition of dexmedetomidine may further influence sympathetic activity through its action on alpha-2 adrenergic receptors. This provides a plausible pharmacological explanation for the higher incidence of hypotension observed in the dexmedetomidine group.

Dexmedetomidine acts centrally to reduce sympathetic outflow and norepinephrine release. It also has effects on spinal nociceptive transmission, accounting for its analgesic properties.[5,7]These pharmacological effects may be beneficial for analgesia but may also contribute to reduced arterial pressure, particularly when combined with the sympathetic blockade produced by spinal anaesthesia. The present finding is consistent with the recognition of hypotension as a possible adverse effect of intrathecal dexmedetomidine. Zhang and colleagues, in a meta-analysis evaluating different doses of intrathecal dexmedetomidine, identified hypotension and bradycardia among the reported adverse events associated with its use.[11] The possibility of dose-related haemodynamic effects is relevant when selecting dexmedetomidine for patients undergoing spinal anaesthesia. El-Attar and colleagues also reported a higher incidence of hypotension in patients receiving intrathecal dexmedetomidine compared with their comparator group.[12] These findings support the need for careful cardiovascular monitoring when dexmedetomidine is used as an intrathecal adjuvant. However, the findings of the present study should not be interpreted as proof that dexmedetomidine invariably causes clinically significant hypotension. The observed incidence may be influenced by the dose administered, the dose and baricity of bupivacaine, patient selection, the definition of hypotension, fluid administration and the frequency of blood pressure measurements.

Dexamethasone was associated with a lower incidence of intraoperative hypotension in this study. Only one patient in the dexamethasone group developed hypotension, compared with 10 patients in the dexmedetomidine group. The pharmacological actions of dexamethasone differ from those of dexmedetomidine. Dexamethasone is primarily an anti-inflammatory agent, and its analgesic effects have been attributed to modulation of inflammatory processes and nociceptive transmission.[8,9,12] Unlike dexmedetomidine, it does not exert the same central alpha-2-mediated sympatholytic effect. The lower observed incidence of hypotension in the dexamethasone group may therefore reflect its different pharmacological profile.[13,14] It is important, however, not to conclude that dexamethasone prevents spinal hypotension on the basis of this comparison alone. The study compared two active adjuvants and did not include a bupivacaine-only control group. Consequently, the findings demonstrate a difference between the two study regimens rather than the independent protective effect of dexamethasone. Ashoor and colleagues investigated the effect of dexamethasone on post-spinal hypotension in geriatric patients undergoing orthopaedic surgery and reported that dexamethasone could attenuate post-spinal hypotension.[13] Although their study involved a different patient population, it provides relevant background for considering dexamethasone as an adjuvant in relation to haemodynamic outcomes. In contrast, Elshahawy and colleagues did not find a statistically significant difference in hypotension between dexmedetomidine and dexamethasone in their study of emergency lower-limb orthopaedic procedures.[10] Differences in patient characteristics, study protocols, doses and definitions of hypotension may account for the variation in findings.[15,16]

Bradycardia occurred in 11.8% of patients in the dexmedetomidine group and 5.9% in the dexamethasone group. Although the incidence was numerically higher in the dexmedetomidine group, the difference was not statistically significant. The higher numerical incidence of bradycardia is pharmacologically plausible. Dexmedetomidine reduces sympathetic activity and may increase vagal predominance, resulting in a reduction in heart rate. Its cardiovascular effects have been documented in studies of systemic administration and in regional anaesthesia.[7,14,16] The absence of a statistically significant difference in the present study should be interpreted in the context of the small sample size. With only six bradycardia events, the study may have had insufficient statistical power to detect a clinically relevant difference. Tachycardia was also more frequent numerically in the dexmedetomidine group, occurring in three patients compared with one patient in the dexamethasone group. The difference was not statistically significant. Tachycardia during surgery may be influenced by several factors, including pain, anxiety, surgical stimulation, intravascular volume and compensatory responses to reductions in arterial pressure. The available results do not establish the specific mechanisms responsible for these episodes.

The higher incidence of hypotension associated with dexmedetomidine has implications for anaesthetic drug selection. The choice of an intrathecal adjuvant should not be based solely on the duration of analgesia or the quality of sensory blockade. It should also consider the haemodynamic profile of the drug and the patient's underlying cardiovascular status. In this study, dexmedetomidine was associated with a longer duration of analgesia than dexamethasone, with mean durations of 328.6 ± 28.1 minutes and 263.0 ± 26.1 minutes, respectively. It also produced a faster onset of sensory and motor blockade. However, these analgesic advantages occurred alongside a higher incidence of intraoperative

hypotension. This illustrates the importance of balancing efficacy and safety. For a relatively healthy patient undergoing lower-limb orthopaedic surgery, dexmedetomidine may offer valuable analgesic benefits when appropriate monitoring and treatment are available. Conversely, dexamethasone may be a reasonable alternative when avoidance of additional sympatholytic effects is a priority. The findings should not be extrapolated uncritically to patients with significant cardiovascular disease, older patients with limited physiological reserve or patients with ASA physical status III and above, as these groups were not represented in the study.

The findings reinforce the importance of frequent blood pressure monitoring following spinal anaesthesia, particularly when intrathecal dexmedetomidine is used. The study protocol included monitoring every two minutes during the first 15 minutes after spinal injection and every 10 minutes thereafter. This approach facilitates early recognition of haemodynamic changes during the period when spinal sympathetic blockade is developing. Adequate intravenous access, appropriate fluid administration and immediate availability of vasopressors are important components of safe practice.[17,18,19] In the present study, hypotension was managed using intravenous ephedrine boluses, fluids and blood when indicated. The findings also highlight the need for individualized selection of intrathecal adjuvants. Dexmedetomidine may be selected when prolonged analgesia is particularly desirable, but the anaesthetist should remain alert to the possibility of hypotension and bradycardia.[20,21] Dexamethasone may be considered as an alternative, particularly when the potential sympatholytic effects of dexmedetomidine are undesirable.[22,23,24]

This study has several limitations. First, the sample size was relatively small, with only 68 participants divided equally between the two groups. Although the difference in hypotension incidence was statistically significant, the small number of events limits the precision of the estimated effect. Second, the study included only patients with ASA physical status I or II. Consequently, the findings may not be generalizable to patients with significant cardiovascular disease, multiple comorbidities or ASA physical status III and above. Third, the study involved a single centre and a specific orthopaedic surgical population. The results may differ in other surgical populations, particularly obstetric, urological and general surgical patients. Finally, the definition of hypotension was based on systolic blood pressure below 100 mmHg or a reduction greater than 20% from baseline. Other studies may use different thresholds, making direct comparisons of incidence difficult.

5 CONCLUSION

This study demonstrated a significantly higher incidence of intraoperative hypotension among patients who received intrathecal dexmedetomidine compared with those who received dexamethasone as an adjuvant to hyperbaric bupivacaine for unilateral tibiofibular fracture fixation. Hypotension occurred in 29.4% of patients in the bupivacaine-dexmedetomidine group compared with 2.9% in the bupivacaine-dexamethasone group. The incidence of bradycardia and tachycardia was also numerically higher in the dexmedetomidine group, although these differences were not statistically significant. The findings suggest that the haemodynamic effects of intrathecal adjuvants should be considered alongside their analgesic benefits when selecting drugs for spinal anaesthesia. Dexmedetomidine may provide prolonged analgesia, but its use should be accompanied by appropriate haemodynamic monitoring and readiness to treat hypotension.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

Authors have declared that there is no conflict of interest

Statement of ethical approval

Ethical approval was obtained from the Joint Local Ethical Review Committee of the University College Hospital and the University of Ibadan, through the Institute for Advanced Medical Research and Training.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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