



Comparison Of Taylor's Approach And Conventional Approach Of Spinal Anaesthesia In Terms Of Haemodynamic Effects In Elderly Patients For Gynaecological Surgeries

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Abstract

Background and Aims: In the elderly frail patients with spinal deformity and having high-risk for general anaesthesia, paramedian route of spinal anaesthesia (SA) is an alternate safe approach. A single blind, randomized and controlled study was conducted in the Department of Anaesthesiology in a tertiary care hospital, for one year from August 2019 to July 2020. The aim of study was to compare Taylor's approach and Conventional approach of SA in terms of Haemodynamic effects in elderly patients for gynecological surgeries.

Methods: The patients included were of American Society of Anaesthesiologists (ASA) grade I and II. These were divided into two groups Group A & Group B using random allocation software with 50 patients in each group. In group A, Taylor's approach of subarachnoid block at L₅-S₁ space was used while in Group B, conventional approach of SA at L3-L4 was used. Results were evaluated using various appropriate statistical tests.

Results: The incidence of hypotension (mean blood pressure less than 20 % of baseline) was significantly less in group A and was seen in 58 % of patients while it was observed in 76% patients of group B (p-value = 0.05). Only one patient in each study group showed bradycardia (p=1). Mean dose of Mephentermine required in Group A was significantly less and was 3.48±2.99 and in Group B was 4.56±2.58 (p-value = 0.05).

Conclusion: Taylor's Approach of Spinal Anaesthesia is a better approach in terms of haemodynamic stability.

Keywords: Spinal anaesthesia, Bradycardia, Hypotension

Introduction

An increasing proportion of the patients undergoing gynaecological surgeries are elderly.¹ Advancing age, results in anatomical irregularities, reduction in functional reserve and ability to compensate for physiological stresses.²

Conventional midline approach of spinal anaesthesia could be a tedious procedure in elderly patients having calcified supraspinous and interspinous ligaments leading to difficulty in passing thin gauge spinal needles.

An alternative approach for placement of needle is paramedian approach (PMA), with less technical

problems in comparison to midline approach.⁵ It avoids the supraspinous and interspinous ligaments and hits the ligamentum flavum directly after passing through the para-spinal muscles. Also it has less chance of bending or kinking of needle and does not requires flexed position as in midline approach.^{3,4,5}

Spinal anaesthesia has stable haemodynamic variables i.e. it leads to less amount of blood loss, post operative pain, post-operative deep venous thrombosis, post-operative confusion in the elderly age group but faster recovery time, compared to general anaesthesia (GA).¹

Induction of sympathetic block by spinal anaesthesia can lead to hypotension, bradycardia, nausea, vomiting, dysrhythmias and rarely, cardiac arrest.⁶ The incidence of hypotension secondary to SA in elderly patients ranges from 65% to 69%.⁷

In 1940 Taylor described a modified paramedian approach (Taylor or lumbosacral approach) via the L5-S1 space which caused less haemodynamic disturbance.⁸ Also this space is least likely to be obliterated by pathological processes such as degeneration, extensive scarring and obliteration of interspinal spaces.

Based on the above literature, we hypothesized that performing Taylor approach for the spinal anaesthesia in elderly patients kept for gynaecological operations at L5, S1 would result in minimum disruption of haemodynamic variables compared to the conventional spinal anaesthesia at a higher level.

Materials & Methods:

The present prospective randomized controlled single blinded study was conducted in the Department of Anaesthesiology in a tertiary care hospital for one year from August 2019 to July 2020.

Approval was granted by institutional ethical and research committee bearing CTRI No ECR/533/INST/HP/2014/RR-17. Sample size was calculated by taking confidence level at 95%, power of study at 80% and effect size at 25%, which came out to be 100 with 50 participants in each group. Group allocation was done using random allocation software.

The written informed consent was obtained from the patients who were included in the study. The patients included were of ASA grade 1 or 2, in the age group of 60-80 years. The pregnant females and the patients with infection at subarachnoid block injection site, neurological and musculoskeletal disorders, bleeding

disorders and history of allergy to local anaesthetics were excluded from the study.

Patients were subjected to preoperative assessment and were pre-medicated with Tablet Ranitidine 150mg and Tablet Alprazolam 0.5mg on the night before surgery. On shifting to operation theatre, intravenous access was secured in all patients and IV fluid was started. Patients were monitored and recordings were done every 5 minutes for heart rate (H.R), lead II electrocardiography (ECG), pulse oximetry (Spo2) and non invasive blood pressure (NIBP).

The lumbar puncture was performed with 26 gauge spinal needle in the sitting or lateral position using paramedian approach at L5- S1 interspace known as Taylors approach for A group and L3- L4 interspace known as conventional for B group.

Intra-operative vital monitoring such as blood pressure (systolic blood pressure, diastolic blood pressure, mean arterial pressure) and heart rate was done every 5 min for 30 min followed by every 20 min. In case of hypotension i.e. systolic blood pressure less than 90mm Hg or less than 20% from baseline, Inj. Mephentermine 6mg IV bolus was given. If bradycardia i.e heart rate less than 50 beats/min, be recorded, Inj. Glycopyrrolate 0.2 mg was administered intravenously.

The data of the study was recorded on record chart and results were evaluated using various appropriate statistical test like, Mann Whitney U test, student t-test, chi-square test and Fisher exact test whichever was applicable. Continuous variables were represented using mean ± standard deviation (SD) or median. A P-value of < 0.05 was categorically significant.

Results:

Demographically, the two groups were comparable in age distribution and not statistically significant (P-value =0.20). (Table 1)

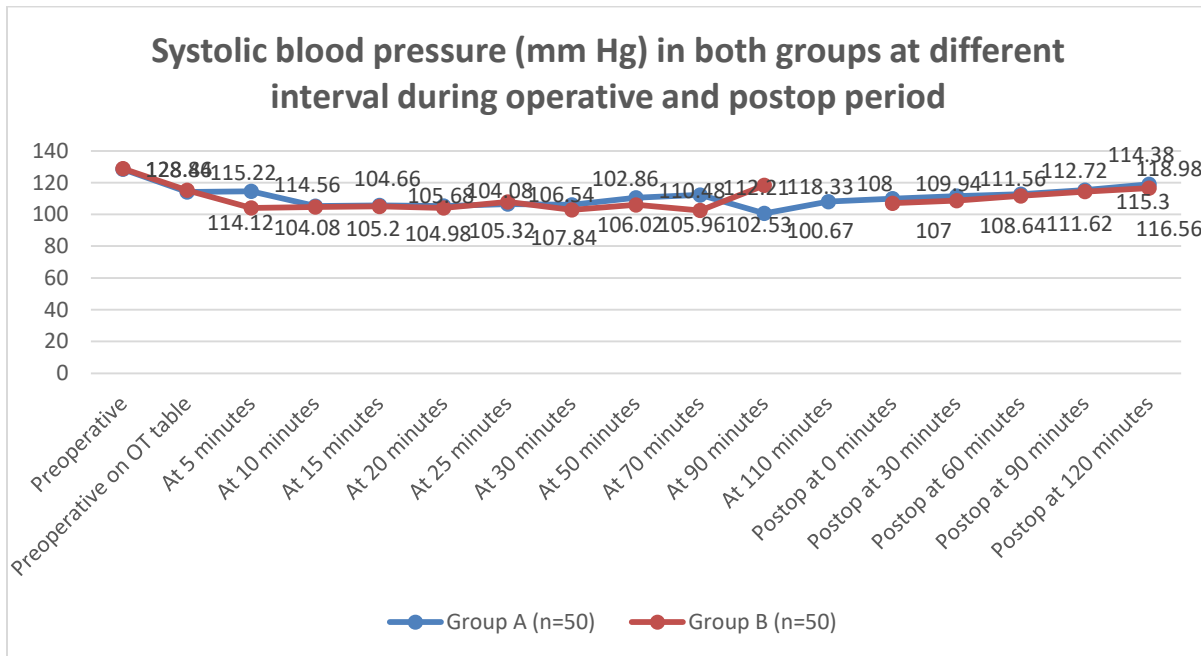
Table 1: Mean age comparison between both groups

	Group A (n=50)	Group B (n=50)	P value
	Mean±SD	Mean±SD	

Mean age in years	62.98±3.38	64.14±5.38	0.20
SD: Standard Deviation, n: number of study participants			

During Surgery systolic blood pressure was measured every 5 min for first 30 min, and then every 20 min for next 2 hours depending on the duration of surgery. In post operative period systolic blood pressure was measured every 30 minutes. While comparing the systolic blood pressure in Group A and B, the difference in almost all time intervals was found to be statistically not significant, except at 5 minutes (P-value <0.01) , 50 minutes (P 0.03) and at 70 minutes (p-value<0.01) and post operatively at 30 min (P 0.04) (Figure 1).

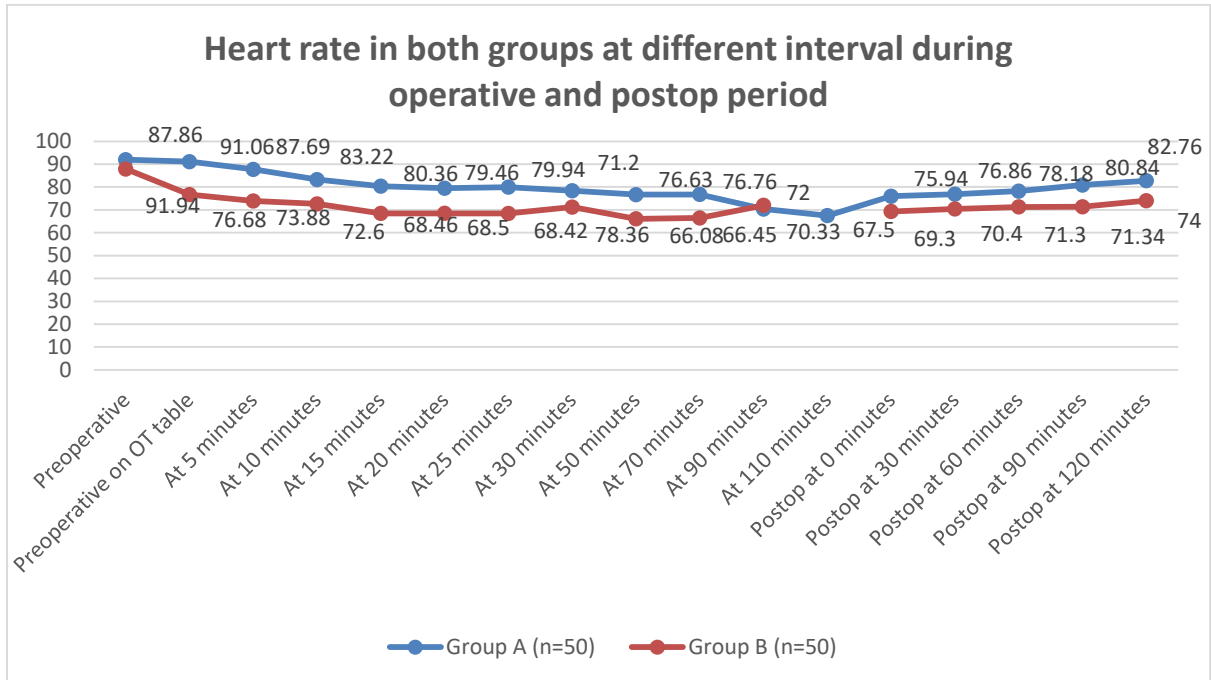
Figure 1: Systolic blood pressure (mm Hg) in both groups at different intervals during operative and postoperative period



Postop: Postoperative, n:number of study participants

Heart rate was recorded every 5 min for first 30 min, then every 20 min for next 2 hour depending on the duration of surgery. While comparing the heart rate, the difference was found to be statistically significant at all intervals after giving subarachnoid block. (Figure 3)

Figure 3: Heart rate in both groups at different intervals during operative and postoperative period



Postop: Postoperative, n: number of participants

The incidence of hypotension (mean blood pressure less than 20 % of baseline) in group A was 58 % and in group B was 76%. Therefore, this incidence of hypotension was found to be statistically significant between the two groups. (Table 2). Hypotension was absent in 42% in Group A and 24% in Group B. Only one patient in each study group showed bradycardia, which was statistically insignificant.

Table 2: Incidence of hypotension and bradycardia in both groups

	Group A (n=50)		Group B (n=50)		P value
	No.	%	No.	%	
Hypotension					
Present	29	58.0	38	76.0	0.05
Absent	21	42.0	12	24.0	
Bradycardia					
Present	1	2.0	1	2.0	-
Absent	49	98.0	49	98.0	
n:number of study participants					

The Single dose of intravenous Mephentermine 6 mg was required in 58% patients in Group A and 60 % patients in group B, whereas 42% patients in group A and 24 % patients in group B did not have hypotension

intraoperatively and thus did not required intravenous Mephentermine. The P value was 0.05 and the difference was statistically significant. (Table 6)

Only 2% patients in both A and B groups required Glycopyrrolate due to bradycardia. The difference was statistically in significant. (Table 3)

Table 3: Requirement of Mephentermine and Glycopyrrolate both groups

Requirement (number of doses of Mephentermine)	Group A (n=50)		Group B (n=50)		P value
	No.	%	No.	%	
0	21	42.0	12	24.0	0.05
1	29	58.0	38	76.0	
Requirement of Glycopyrrolate					
No	49	98.0	49	98.0	1.0
Yes	1	2.0	1	2	
n:number of study participants					

Discussion

In the elderly frail patients having spinal deformity and who have been declared high-risk for general anaesthesia, where lumbar puncture through midline approach fails, paramedian route is an alternate safe approach with faster catheter insertion and success rate of up to 100%.⁴

There are very few studies on performance of SA at the level of L5, S1 interspace in below umbilical surgeries and its comparison to Conventional approach of spinal anaesthesia. Case reports of SA for caesarean section in patients with previous corrective spine surgery being inserted successfully at the level of L5, S1 have been reported.⁹ But not even a single study has been reported for gynaecological surgeries using Taylor’s approach or its comparison to conventional approach

In the present study, decrease in heart rate was found to be more in group B but only one patient in each group required one dose of Glycopyrrolate for bradycardia, thus showing no statistical difference in incidence of bradycardia between two groups.

Our study matched to study conducted by Litz et al, who found that the maximum decrease in heart rate

was greater in Lumbar group than Taylor group.¹⁰ Our study did not match the study by B.TH.Veering et al in 1996, who on comparing the effect of site of injection of 0.5% hyperbaric bupivacaine on spread of spinal anaesthesia in elderly, found decrease in heart rate in group 1(injection at L3-L4 interspace) and in group 2 (injection at L4-L5 interspace) to be 11% and 13% respectively, though it was not statistically significant.¹¹ Vitalis Mung’ayi et al in 2015 while comparing the haemodynamic stability in elderly patients undergoing spinal anaesthesia at L5-S1 versus spinal anaesthesia at L3-L4 found that incidence of bradycardia in control and intervention group was 10% and 15% respectively but the difference was not found to be statistically significant.¹²

Both Systolic and Diastolic blood pressures in Group A and Group B decreased from baseline but the overall difference was statistically insignificant between two groups. However the incidence of hypotension i.e mean blood pressure less than 20 % of baseline in group A and group B was 58 % and 76% respectively. Therefore, this incidence of hypotension was found to be statistically significant between the two groups.

Mean dose of Mephentermine for hypotension required in Group A was 3.48 ± 2.99 mg, where mean dose required in Group B was 4.56 ± 2.58 . Our study showed little comparison to study conducted by Litz et al, who found that the incidence of hypotension was greater i.e $14.9 \pm 8.6\%$ in lumbar group than Taylor group where it was $10.5 \pm 8.3\%$, which was statistically significant.^[10] Vitalis Mung'ayi et al found that the number of hypotensive episodes in intervention (L5-S1) and control group (L3-L4) was 41 and 65 respectively out of the total episodes of 106 noticed during the study. The difference was found to be statistically significant.^[12] B.TH.Veering et al, found that maximum decrease in blood pressure in group 1 (injection at L3-L4 interspace) and in group 2 (injection at L4-L5 interspace) was 23% and 18% respectively though it was not found to be statistically significant.¹¹

Our study did not match study by K.H.Olsen et al done in 1990, who while comparing the spinal analgesia with plain 0.5% bupivacaine administered at spinal interspace L2-L3 or L4-L5 found that incidence of hypotension in both group was 8% which was statistically insignificant.⁹

Taylor's approach is a better approach in terms of haemodynamic stability as evident by the fewer episodes of hypotension and lower doses of Mephentermine required in our study. It must be regularly used, practiced and taught in normal patients to acquire knowledge, skills and gain proficiency so that it can be an addition to the armamentarium of anaesthetists for difficult cases.

Our study has limitation that it was conducted at a single centre involving a relatively small number of patients and a wide range of procedures. This may show impact on the generalization of the results. Therefore large prospective randomized control studies are required to elucidate the advantages and disadvantages of this technique as compared to the conventional techniques.

Conclusion

Taylor's or Lumbosacral approach is a modified paramedian approach via the L5-S1 space, which could be attempted in all types of gynecological surgeries in our study. It is a better approach in terms of haemodynamic stability as evident by the less

episodes of hypotension and lower doses of Mephentermine required in our study.

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