

Study of inter arm blood pressure difference in pre-operative evaluation

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I. Introduction

Blood pressure is a simple, non-invasive tool that can be easily obtained in an office setting. An increased interarm systolic blood pressure difference is defined as 10mmHg or greater^[1]. It is an easily missed physical finding in patients coming for preoperative anaesthetic evaluation.

Studies have shown that in an interarm blood pressure difference is associated with a significant increased risk for future cardiovascular events, even when the absolute difference in arm systolic blood pressure is modest. A marked difference in systolic blood pressure between the two arms have been linked to atherosclerotic plaques^[2], subclavian stenosis^[3] and are most commonly observed in patients with hypertension^[4], diabetes^[5], and chronic renal disease^[3], suggesting interarm difference as a marker of peripheral vascular disease. The presence of interarm blood pressure difference has been linked to delayed diagnosis^[6] and poor control of hypertension^[7]. Hence, measurement of blood pressure in both arms is increasingly important for risk stratification and hemodynamic evaluation in the ambulant and perioperative setting.

Detection of an interarm difference should prompt consideration of further vascular assessment and aggressive management of risk factors^[4]. In few patients there is a significant difference in interarm blood pressure which if not observed in the preoperative period may prompt us to administer vasoactive drugs that may not be indicated.

Considering all these observations, our study is designed to determine the interarm blood pressure difference during the pre-operative evaluation of patients posted for elective procedures.

II. Methodology

After ethical committee approval and consent, 116 patients belonging to "American society of Anesthesiology" (ASA) physical status I, II and III of either sex, aged between 20 to 70 years, scheduled for various elective surgeries were enrolled.

On arrival the patient to the Pre-anaesthetic checkup clinic, thorough pre-anaesthetic evaluation was carried out by the same anaesthesiologist. Hypertensive patients were excluded from the study.

Blood pressure was recorded by the same anaesthesiologist. A normal mercury sphygmomanometer was used employing Korotkov I to V. Each patient was rested in supine position for five minutes before the blood pressure measurement. A single measurement was taken in each arm with no significant wait period between readings. Measurement was taken in the arm first presented without prompting, and the cuff was then swapped to the other arm and another measurement taken.

III. Results

Results from 116 patients were available for analysis. There were 47 females and 69 males aged (mean \pm standard deviation) 41.49 ± 13.055 and 41.62 ± 14.035 years, respectively.

The percentage of patients with the British Hypertension Society significance values of 20 mm Hg systolic and 10 mm Hg diastolic difference were 0.9% and 7.8 % respectively. Out of 0.9%, 12.5% patients belonged to age group of above 61 years and 16.7% out of 7.8% had a interarm diastolic blood pressure difference of >10 mm Hg.

The mean systolic blood pressure of right arm was 132.66 ± 10.336 mm Hg and of left arm 129.24 ± 9.807 mm Hg. The mean diastolic blood pressure of right arm and left arm were 81.05 ± 8.054 and 79.07 ± 7.826 respectively.

There is a small but statistically significant (P value < 0.001) bias to the right arm systolic, diastolic and mean blood pressure measuring higher than the left by 3.422 mm Hg, 1.983 mm Hg and 2.216 mm Hg respectively.

IV. Discussion

The present study is undertaken to determine if there is significant difference in blood pressure between two arms. British Hypertension Society guidelines suggest that blood pressure should be measured in both arms^[8,9]. The latest guidelines advise clinicians to repeat the measurements if the systolic difference is >20 mmHg between the two arms and to measure subsequent blood pressures in the arm with the higher reading if the difference is confirmed^[10].

Cassidy P et al^[11] conducted a study of inter-arm blood pressure differences in primary care on 237 patients and concluded that in a primary care setting blood pressure should be measured routinely in both arms. If one arm is to be preferred for pragmatic clinical purposes, then this should be the right arm.

Clark CE et al^[4] conducted a primary care cohort study on the difference in blood pressure readings between arms and survival in 230 patients out of which 55 patients had mean interarm systolic blood pressure difference of 10mmHg or more and 21 had 15mmHg and concluded that these differences could be a valuable indicator of increased cardiovascular risk. Observed discrepancy in systolic blood pressure between arms (systolic inter-arm difference) is a controversial clinical feature associated with the severity of underlying systemic atherosclerotic disease. Durrand JW et al^[12] demonstrated that a substantial inter-arm blood pressure difference is common in the vascular surgical population.

Furthermore, Clark CE et al^[13] studied the prevalence and clinical implications of the inter-arm blood pressure difference by using data sources like Medline EMBASE and CINAHL databases, and Index of Theses.

V. Conclusion

This was a hospital based study conducted over period of one month in which we conclude that blood pressure of right arm is higher compared to left arm. Assessment of blood pressure in both arms should become a core component of initial blood pressure measurement in primary care and preoperative assessment that helps in better perioperative management and avoidance of unnecessary drug administration.

Table 1

	Systolic blood pressure	Diastolic blood pressure				
	Frequency	Percent	Frequency	Percent		
Difference in blood pressure	<10	105	90.5	107	92.2	
	10-20	10	8.6	9	7.8	
	>=20	1	.9	-	-	
	Total	116	100.0	116	100.0	

Table 2

	Mean	Mean difference	t value	P value	Significance	
	Right	Left				
Systolic Blood pressure	132.66 ± 10.336	129.24 ± 9.807	3.422 ± 4.255	8.662	<0.001	S
Diastolic Blood pressure	81.05 ± 8.054	79.07 ± 7.826	1.983 ± 3.524	6.06	<0.001	S
Mean arterial pressure	98.09 ± 8.062	95.88 ± 7.487	2.216 ± 3.949	6.042	<0.001	S

S – Significant

Table 3

	AGE	Total						
	<30	31-40	41-50	51-60	>61			
Systolic BP Difference	<10	Count	26	27	22	16	14	105
		% within AGE	92.9%	93.1%	88.0%	88.9%	87.5%	90.5%
	10-20	Count	2	2	3	1	2	10
		% within AGE	7.1%	6.9%	12.0%	5.6%	12.5%	8.6%
	>=20	Count	0	0	0	1	0	1
		% within AGE	0.0%	0.0%	0.0%	5.6%	0.0%	0.9%

Total	Count	28	29	25	18	16	116
	% within AGE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4

	AGE	Total						
	<30	31-40	41-50	51-60	>61			
Diastolic BP Difference	<10	Count	26	29	22	15	15	107
		% within AGE	92.9%	100.0%	88.0%	83.3%	93.8%	92.2%
	10-20	Count	2	0	3	3	1	9
		% within AGE	7.1%	0.0%	12.0%	16.7%	6.2%	7.8%
Total	Count	28	29	25	18	16	116	
	% within AGE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

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