INTRA-OPERATIVE HYPOTENSION;

INDUCTION OF ANESTHESIA IN PATIENTS CONTINUING THEIR ROUTINE DOSE OF ANGIOTENSIN SYSTEM INHIBITOR THERAPY BEFORE SURGERY

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ABSTRACT… Objective: To determine the frequency of intra-operative hypotension following induction of Anesthesia in patients continuing their routine dose of angiotensin system inhibitor therapy before surgery. **Study design:** Cross-sectional study. **Setting:** Department of Anaesthesiology, Combined Military Hospital, Quetta. **Duration of study:** One year from 20-08-2010 to 19-08-2011. **Subjects and methods:** Total 92 hypertensive patients were included in this study. Diagnostic criteria for patients was those cases receiving ACEI/ARA therapy for at least 3 months with admission preoperative arterial blood pressure of >150/90mmHg. **Results:** Mean age of the patients was 47.70±8.47 years. Out of 92 patients, 38 patients (41.3%) were male while remaining 54 patients (58.7%) were female. Distribution of cases by hypotension after induction of anesthesia shows, hypotension at 30 minute in 55 patients (59.8%) and hypotension at 60 minute in 37 patients (40.2%). Out of 55 hypotensive patients (at 30 minute) 17 patients (30.9%) had mild hypotension, 32 patients (58.2%) had moderate hypotension and 6 patients (10.9%) had severe hypotension. Out of 37 hypotensive patients (at 60 minute) 8 patients (21.6%) had mild hypotension, 25 patients (67.6%) had moderate hypotension and 4 patients (10.8%) had severe hypotension. **Conclusions:** Hypertensive patients continuing their routine angiotensin system inhibitors therapy (<10 hr preoperative) have a variable risk of developing moderate hypotension within 30 minutes after induction. This moderate hypotension proved to be of little clinical significance as it responded to conventional therapy.

Key words: ACEI, ARA, hypotension

INTRODUCTION

The rennin-angiotensin system inhibitors, such as angiotensin converting enzyme inhibitors and angiotensin receptor antagonists are often used in the management of hypertension, congestive cardiac failure and chronic renal failure[1,2]. For their well-established renal protective and cardio-protective role they are considered the first line antihypertensive therapy for diabetic and hypertensive patients[3].

Many patients who present for surgery having hypertension are on chronic therapy with either of these two classes of drugs. Generally the patients who are receiving ACEI/ARA treatment for at least three months are eligible to qualify for the label of chronic therapy[4].

The primary protection of ACEI/ARA against cardiovascular events similar to that produced by calcium antagonist was demonstrated in the VALUE study[5]. In another study, increased frequency of hypotension was seen after the induction of anaesthesia when ACEI/ARA therapy was continued in the morning of surgery[6]. Whereas in other studies it was shown that despite ACEI/ARA withdrawal for at least 12 and 24 hours the incidence of hypotension was >70%[7]. Current opinion recommends continuation of antihypertensive medications up to the time of surgery, patients receiving ACEI/ARA therapy before anaesthesia have risk of moderate hypotension within 30 minutes after induction but this hypotension responds to conventional therapy[4].

The rationale for choosing this study is the immense importance of haemodynamic stability during anaesthesia and a big query that whether angiotensin system inhibitors be withdrawn preoperatively or not. Number of studies have been done worldwide, in our set up it will be a new study and outcome of our study will provide us with information about continuation or

discontinuation of therapy before surgery. Results of study were shared with other health care providers so that if the frequency of hypotension is found to be low they can advice their patient to continue the therapy before surgery.

MATERIAL AND METHOD

Study design

Cross-sectional study.

Setting

Department of Anaesthesiology, Combined Military Hospital, Quetta.

Duration of study

Study was carried out over a period of one year from 20-08-2010 to 19-08-2011.

Sample size

The sample size calculated is 92 hypertensive patients on chronic therapy with angiotensin system inhibitors, keeping confidence level at 95%, absolute precision required at 10% and anticipated population proportion of patients taking angiotensin system inhibitors 60.4%.

Sampling technique

Convenience sampling.

Sample selection

Inclusion Criteria

1. Adult male and female patients between the age 30 and 65 years.
2. ASA physical status of I, II and III.
3. Known hypertensive patients already on ACE inhibitors or angiotensin receptor antagonists as a mono therapy for more than three months.
4. Patients having elective abdominal surgery or gynaecological surgery.

Exclusion Criteria

Following cases were excluded as it is not possible to give routine anaesthesia in such cases. If these are included in the sample they will act as effect modifiers thus introducing bias in study results.

1. Patients having emergency surgery.
2. Patients having ejection fraction less than 60%.
3. Patients with fixed cardiac output states.
4. Patients below the age of 25 and above 65 years of age.

Procedure

The study was conducted after approval from the hospital ethical committee. Patients were admitted through OPD in surgical and gynaecological wards. Ethically we provided comfort, privacy and protection to the patient. All the data was collected after taking informed consent and explaining the risk benefit ratio of the procedure to the patient. Systolic hypotension was classified into severe ($\leqslant$ 65), moderate ($\leqslant$ 85) and mild ($\leqslant$ 100). Diagnostic criteria for including patients in our study were those cases receiving ACE1/ARA therapy for at least 3 months with admission preoperative arterial blood pressure of < 150/90mmHg. All patients were administered general anaesthesia. They were induced with injection morphine 5mg, propofol 1-2mg/kg, vecuronium 7-8mg followed by intubation. Anaesthesia was maintained by 60 percent nitrous, 40 percent oxygen and 1-2 percent sevoflurane. Patients were extubated when fully conscious after giving lignocaine 1mg/kg two to three minutes before extubation to obtund the sympathetic response to extubation. The blood pressure of all the patients were checked and recorded before coming to operation theatre, pre-operatively before cannulation, post-induction and pre-intubation and just after intubation. Blood pressure was also checked 30 and 60 minutes after intubation respectively and after recovery.

To exclude bias exclusion criteria was strictly followed. Patients going into complication during surgery were excluded as they can prove effect modifiers. Documentation was done of any surges in blood pressure or any recovery efforts used. All the information was collected through a proforma.

The data collected through the proforma was entered in the statistical package for social sciences (SPSS). Version 10.0 and analyzed through its statistical package. The main variable in our study the systolic blood pressure was recorded at different time intervals, it was classified into mild, moderate and severe

Table-I. Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Baseline SBP	92	110	170	146.09	14.048
SBP before intubation	92	60	150	107.76	14.095
Heart rate at baseline	92	60	110	82.52	10.295
BP after 15 minute of induction	92	88	160	120.02	14.326
BP after 30 minute of induction	92	98	160	116.22	11.155
BP after 60 minute of induction	92	90	146	118.39	10.387
BP after recovery at 15 minute	92	100	160	123.87	11.379
BP after recovery at 30 minute	92	100	180	127.98	14.221

hypotension, their mean was calculated and standard deviation was measured. The frequency of mild moderate and severe hypotension was calculated at after 30, 60 minutes after intubation and presented as tables.

RESULTS

A total of 92 patients were included in this study during the study period of one year from 20-08-2010 to 19-08-2011.

(Table-I) represents the descriptive statistics of blood pressure and heart rate.

Distribution of cases by hypotension after induction of anesthesia shows, hypotension at 30 minute in 55 patients (59.8%) and hypotension at 60 minute in 37 patients (40.2%) (Table-II).

Out of 55 hypotensive patients (at 30 minute) 17 patients (30.9%) had mild hypotension, 32 patients (58.2%) had moderate hypotension and 6 patients (10.9%) had severe hypotension (Table-III).

Out of 37 hypotensive patients (at 60 minute) 8 patients (21.6%) had mild hypotension, 25 patients (67.6%) had moderate hypotension and 4 patients (10.8%) had severe hypotension (Table-IV).

DISCUSSION

Intraoperative hemodynamic stability has been observed

Table-II. Distribution of cases by hypotension after induction of anesthesia(n=92)		
Hypotension	Number	%age
At 30 minutes	55	59.8
At 60 minutes	37	40.2

Table-III. Distribution of cases by hypotension after induction of anesthesia at 30 minutes (n=55)		
Hypotension	Number	%age
Mild	17	30.9
Moderate	32	58.2
Severe	06	10.9
Total	55	100.0

Table-IV. Distribution of cases by hypotension after induction of anesthesia at 60 minutes (n=37)		
Hypotension	Number	%age
Mild	08	21.6
Moderate	25	67.6
Severe	04	10.8
Total	37	100.0

in patients treated with preoperative ACEI[8] and ARA[9], and adequate perioperative management of antihypertensive therapy in patients receiving angiotensin system blockers has been debated[10]. Because of the fear of post-induction hypotension[8], some groups have developed algorithms to routinely omit the ACEI/ARA therapy before surgery[11]. Other authors have suggested that omitting ACEI before surgery does not have sufficient advantage to be routinely recommended[12].

Existing studies examining the perioperative use of ACEI/ARA randomized patients to receive their last dose either the night before or the morning of surgery. These studies were performed on smaller populations and higher-risk patients[12]. Coriat et al found no alteration in hemodynamic stability during surgery but found an increased probability of hypotension at induction for vascular surgery[8]. However, there is little information regarding how the preoperative management of these drugs may affect actual clinical practice, in which there are many other uncontrolled factors.

In my study, within first 30 minutes, out of 92 cases, moderate hypotension developed in 55 patients (59.8%). Out of these 55 patients, during the first 30 minutes after anesthetic induction, moderate hypotension was more frequent in 32 patients following, 17 had mild and 6 had severe hypotension.

Similarly, at 60 minute after induction of anesthesia, out of 92 cases, 37 patients (40.2%) developed hypotension. Out of these 37 patients, 25 patients had moderate hypotension, 8 patients had mild and 4 patients had sever hypotension.
Comfere et al[4] reported that omitting ACEI/ARA therapy at >10 hours before anesthesia significantly reduced the likelihood of developing hypotension. Of interest, this time period roughly corresponds to most of the half-lives of ACEI/ ARA used in this study. There were more hypotensive episodes during the first 30 minutes compared with 31–60 minutes after induction; this may be attributed to improved cardiovascular adaptation and increased volume loading, which led to stabilization of arterial blood pressure. Of note, the percentage of hypotensive episodes after induction in <10 h and > 10 h groups was 60.4% and 46.3%.

In contrast, Colson et al[13] suggested more pronounced hypotension in patients who were, besides ACEI, taking multiple antihypertensive drugs.

Despite reports of intraoperative hypotension, some authors have recommended continued perioperative ACEI/ARA therapy. Boldt et al [14] suggested that their uninterrupted use could be associated with a reduction of ischemia-related myocardial cell damage in cardiac surgery. Furthermore, Colson et al[15] found that during cardiopulmonary bypass, effective renal plasma flow and the glomerular filtration rate remained unaltered, whereas the urinary excretion of sodium was greater in patients receiving captopril compared with the placebo group. No studies examined the potential protective value of uninterrupted ACEI therapy in patients at higher risk for developing renal failure. Therefore, the exact management of ACEI/ARA therapy in the perioperative period still needs to be studied in larger patient populations with different risk factors to assess the risk-benefit profile of these therapies[15].

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