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Hypotension during General Anesthesia and Epidural Anesthesia Decreases Blood Lose and the Need for Blood Transfusion, in Radical Cystectomy.

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Abstract

Radical cystectomy procedure is seen to have large amount of blood lose and is noted that patient going through this procedure very often need blood transfusion. In our study, we discovered that induced hypotension while general and epidural anesthesia decreases the need for blood transfusion on the patients undergoing radical cystectomy procedure. Prospective, Randomized, single-blind trial. Time period, from January 2001-December 2012, 182 patients that were to have a radical cystectomy surgery. Pts(Patients) were divided in two groups, 90 patients in each group (two patients were excluded from the study because unable to perform epidural). But also are excluded from this study the patients with history of diathesis hemorrhage, aortic and mitral stenosis, unmanaged hypertension with diastolic >110mm/hg, with a history of myocardial infarction than one year preoperational, previous cerebral vascular accident, previous ischemic transient on previous six months were eliminated from this study, on light of laboratory value are eliminated patient with hematocrit <30. The group of patients that was excluded from the study is not included in the 182 patients. One group which was the control group underwent a general anesthesia during the procedure, and the other group had general anesthesia and epidural anesthesia together during the procedure. Cystectomy with or not neovesica. During the procedure blood pressure (BP), heart rate, sol. use, blood lose and blood transfusion were monitored continuously. Epidural catheter was placed on the T12-L1 level and Lidocaine 2% is continuously infused on a rate of 70-90 mg/hour. In our results; Blood lose the group that had general and epidural anesthesia together had significantly smaller amount of blood loss, compared with the control group.

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Differences between two groups in Blood pressure (Systolic and Diastolic), blood loss and blood transfusion are explained very clear on the tables below. On both groups there was not seen any serious side effects during the study. Conclusion: The use of induced hypotension from combination of general anesthesia with epidural anesthesia results in significantly lower level of blood lose and decrease the need for blood transfusion in patient that undergo radical cystectomy procedure. Compared with the patients that go through the same procedure but they go only under general anesthesia.

Keywords: cystectomy; epidural anesthesia; blood pressure; heart rate.

1. Introduction

Blood lose during a surgery can be reduced if we have an induced hypotension [1]. This is a technique in which blood pressure (BP) is being intentionally kept at 80/60 mm/hg. Induced hypotension likely assures a dry surgery area [2]. A previous study on the radical prostatectomy reported that only 25% of patients with induced hypotension (hypotension was induced by receiving nitroprusside) received blood transfusion in comparison with 60% of the patients of the controlled group [3]. Epidural anesthesia [4] can have many advantages compare with other induced hypotension techniques [5]. There is evidence that in cases that was used epidural induced hypotension blood lose in major surgeries was smaller compared with cases when epidural induced hypotension was not used. Central neuronal blockade is accompanied with less blood loss on the major surgeries [6]. Epidural anesthesia on the major surgeries. Epidural anesthesia with induced hypotension has been used on elderly patient with history of hypertension [7] and it has result on minimal blood loss on total hip arthroplasty [8].

2. Materials and Methods

182 patients ASA I-II with bladder papilocarcinome were participant on a prospective randomized single-blinded study. Patients with history of diathesis hemorrhage, aortic and mitral stenosis, unmanaged hypertension with diastolic >110mm/hg, with a history of myocardial infarction than one year preoperational, previous cerebral vascular accident, previous ischemic transient on previous six months were eliminated from this study, on light of laboratory value are eliminated patient with hematocrit <30. Element that were analyzed before surgery were blood hematocrit levels and differentials, uremia, electrolytes, creatinine, glycemia, transaminase, total protein, bilirubine, ECG. All patient received 5000UI s/c heparin for thrombus prophylaxis, after the insertion of epidural and before intubation, approximately 40min before the procedure. All epidurals were inserted while pts was awake on sitting position on continue monitoring. Epidural catheter was inserted between last thorax and first lumbar epidural. As the test dose was used 3ml lidocaine 2% to prevent complication in case epidural catheter was inserted on subarachnoid space or intravascular. Medication used were fentanyl thiopental and pancuronium, and light endotracheal intubation. Ventilation was performed with O₂ and sevofluran. Monitoring intraoperative included ECG and invasive arterial pressure through radial artery. Induced anesthesia was followed with the use of anesthesia was followed with the use of Lidocaine 2% through epidural catheter. All patients beside an normal IV they had an dextra jugular centerline. As

anesthetic pt received fentanyl and pancuronium. Patients was given ringers lactate (RL) and colloide (HEAS) value Blood presure medium (MAP) <60mmhg were treated with likide and vasopresore. All likids were used warmed to assure body temp >35.5grade Celsius. Blood loss was calculated by measuring the accumulated blood on the suction and the wet sponges. On consideration are taken parameters such as procedure time, days that pt stayed in the hospital, differentials (hematocrit) every two days until the pt was discharged. There were no serious complications such as deaths, myocardial infarcts, cerebral ischemic transitory, deep vein thromboses, and pulmonary embolism.

3. Results

Refer to the appropriate table re lost blood and blood transfuse on both groups. From 182 patients, two patients were excluded from the study because unable to perform epidural. Patients of both groups had similar parameters red blood volume; hematocrit levels, and differential levels, differences on the ECG readings were not statistically significant. Hypotensive anesthesia was associated with significant reduction of blood loss. Average volume of cristaloide infusion was lower to the group that received epidural, while colloide infusion was the same. The average surgery time was shorter for patient of the group that received epidural on comparison with the control group, furthermore the hospital stay was also shorter for the epidural group. Postoperatively values such as hematocrit level, creatinin, and ECG were closely followed. Hematocrit levels was repeated every 2 days. From 89 patient of the control group without epidural 50 patients received blood transfusion, compared with 15 patients that received blood transfusion for that received blood transfusion for the group with 89 patients that had epidural. Vazopresore was used on both groups on case of hypotension. The lidocaine 2% dose that was administered intra-operatively was average 65mg (30-120mg). None of the patients needed vazopresore such as adrenaline post-operatively. There was only one episode of ST depression on the study group compare with none of the control group. This depression was seen on ECG right after surgery and disappeared a few hours after on the first day pos-op. CK.MB and troponin were normal. None of the patient on the study group had cefale. Data that was collected from the study was placed on the appropriate tables and the results were as below. Arterial systolic pressure while in epidural anesthesia varies from 88mm/Hg to 105 mm/Hg with an average 95.97mm/Hg. Diastolic blood pressure while in epidural anaesthesia varies from 54mm/Hg to 76mm/Hg, with an average 64.7mm/Hg. Systolic blood pressure on the control group varied from 125 mm/Hg to 160 mm/Hg, with an average 142.9 mm/Hg. Arterials diastolic on the control group has varied from 65mm/Hg to 100mm/Hg with a average of 84.47mm/Hg. Data collected from the study on the appropriate tables provides those results re heart rate. Heart Rate while in epidural varied from 52/min to 78/min with mea 62/min. Heart Rate to the controll group varied from 76 /min to 131 /min. Blood loss results in ml(millilitra) .On cases of epidural use has varied from , the maximum 800ml and minimal 320ml with an average of 552,58ml. On the control group blood loss has varied from where maximum has been 1300 and minimal 140ml blood loss, with an average 948.42ml.

Table.1.Sistolic Blood Pressure (SBP).

	<i>Column1 (epidural)</i>	<i>Column2 (control)</i>
Mean	95.97	142.90
Standard Error	0.42	0.85
Median	96.00	143.00
Mode	97.00	140.00
Standard Deviation	4.00	8.03
Sample Variance	15.97	64.54
Kurtosis	(0.29)	(0.20)
Skewness	0.04	(0.19)
Range	17.00	35.00
Minimum	88.00	125.00
Maximum	105.00	160.00
Sum	8,637.00	12,861.00
Count	90.00	90.00

Table.2 .ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	99123.2	1	99123.2	2462.516343	3.5332E-106	3.894232
Within Groups	7165	178	40.25280899			
Total	106288.2	179	Total			

Table.3. Anova: two Factor.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Rows	3387.2	89	38.05842697	0.896606491	0.696105802	1.419888
Columns	99123.2	1	99123.2	2335.21224	1.17065E-65	3.948084
Error	3777.8	89	42.44719101			
Total	106288.2	179				

Table.4.Diastolic Blood Pressure(DBP).

	<i>Column1 (epidural)</i>	<i>Column2 (control)</i>
Mean	64.7	84.47777778
Standard Error	0.494274	1.094330843
Median	65	87
Mode	68	89
Standard Deviation	4.689098	10.38173394
Sample Variance	21.98764	107.7803995
Kurtosis	-0.39808	-1.181038006
Skewness	-0.09734	-0.323374113
Range	22	35
Minimum	54	65
Maximum	76	100
Sum	5823	7603
Count	90	90

Table.5.Matrica of correlacionit (Coeficenteve R).

Correlacioni R	epidural	control
epidural	1.0000	0.2499
control	0.2499	1.0000

Table.6.ANOVA.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	17602.22	1	17602.22222	271.2875	1.25E37	3.894232
Within Groups	11549.36	178	64.88401998			
Total	29151.58	179				

Table.7.ANOVA: Two Factor.

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	6857.578	89	77.05143571	1.461616	0.03754	1.419888
Columns	17602.22	1	17602.22222	333.9028	7.18E-32	3.948084
Error	4691.778	89	52.71660424			
Total	29151.58	179				

Table.8.Heart Rate .

	Column1 (epidural)	Column2 (control)
Mean	62.32584	98.6741573
Standard Error	0.813851	1.027181065
Median	63	99
Mode	61	109
Standard Deviation	7.677854	9.690406785
Sample Variance	58.94944	93.90398366
Kurtosis	43.67258	0.750119389
Skewness	-5.48877	0.355349469
Range	76	55
Minimum	52	76
Maximum	78	131
Sum	5547	8782
Count	89	89

Table.9.Blood loss.

	Column1 (epidural)	Column2 (control)
Mean	552.5843	948.4269663
Standard Error	10.66306	15.61466114
Median	570	950
Mode	550	900
Standard Deviation	100.5951	147.3084185
Sample Variance	10119.38	21699.77017
Kurtosis	-0.26217	9.982756893

Skewness	-0.27984	-1.381241646
Range	480	1160
Minimum	320	140
Maximum	800	1300
Sum	49180	84410
Count	89	89

Table.10.Anova: Single Factor. SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	89	49180	552.5842697	10119.38202
Column 2	89	84410	948.4269663	21699.77017

Table.11.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>
Between Groups	6972769	1	6972769.101	438.2749772	1.2025E-49
Within Groups	2800085	176	15909.5761		
Total	9772854	177			

Table.12.F-Test Two-Sample for Variances.

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	552.5843	948.4269663
Variance	10119.38	21699.77017
Observations	89	89
df	88	88
F	0.466336	
P(F<=f) one-tail	0.000211	
F Critical one-tail	0.702868	

Table.13.Hemotransfusion.

	<i>Column1 (epidural)</i>	<i>Column2 (control)</i>
Mean	0.314606742	1.134831461
Standard Error	0.049500842	0.071805497
Median	0	1
Mode	0	1
Standard Deviation	0.466990014	0.677411706
Sample Variance	0.218079673	0.458886619
Kurtosis	-1.371599098	2.618891811
Skewness	0.812245088	0.727268479
Range	1	4
Minimum	0	0
Maximum	1	4
Sum	28	101
Count	89	89

t-Test: Paired Two Sample for Means

Table.14.

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	89	28	0.314606742	0.218079673
Column 2	89	101	1.134831461	0.458886619

Table.15. *Source of Variation*

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	29.93820225	1	29.93820225	88.44813278	2.82E-17	3.894838
Within Groups	59.57303371	176	0.338483146			
Total	89.51123596	177				

Table 16. Anova: two Factor

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	26.01123596	88	0.295582227	0.775025109	0.883056	1.422742
Columns	29.93820225	1	29.93820225	78.49882826	7.97E-14	3.949321
Error	33.56179775	88	0.381384065			
Total	89.51123596	177				

F-Test Two-Sample for Variances

Table.17.

	Variable 1	Variable 2
Mean	0.314606742	1.134831461
Variance	0.218079673	0.458886619
Observations	89	89
df	88	88
F	0.475236505	
P(F<=f) one-tail	0.00029011	
F Critical one-tail	0.702868205	

4. Discussion

Even though today modern and sophisticated examination methods [9] are used to screen the donated blood [10] before transfusing it and the cases of hepatitis B and C infection has decreased, we should take in consideration the incubation period which can vary on different viruses such the HIV. On recent years in our country are seen cases of thalasemic children being infected with the HIV virus through blood transfusion. On this study where epidural anesthesia combined with endotracheal anesthesia has resulted on intention hypotension and as a result the blood loss has significantly decreased compared with the control group when epidural anesthesia was not used. As consequence the blood transfusion has decreased on the study group compared with the controlled group .The average surgery time on the study group (the hypertensive group) .was reduced by 15min.The facts that were mentioned above I think are enough to suggest that every radical Cystectomy that does not have epidural contraindication beside general anesthesia should use anesthesia epidural as well. One question that can be asked is: what is the risk of mortality from blood transfusion and what is the mortality risk from induced hypotension? And the answer is based on the previous studies the mortality risk from blood transfusion is 0.0001%-0.0004% compared with 0.02%-0.034% from hypotension {but no controlled

(inducted) hypotension}. This is the mortality evaluation on both groups. On the other hand on the calculation of mortality risk from blood transfusion the cases when the same patient receives more than one time blood transfusion was not taken in consideration, while it is know that cancer patient can receive blood transfusion more than one time. On the study that studied cancer patients (colon cancer) was proven that patient that received blood the infection risk was increased two times compared with patient that did not receive blood. Patient that transfuse blood from 1-10 years the infection risk increases from 12%-22% respectively [11]. Taking in consideration those values more patient would prefer to not receive blood transfusion if another alternative was offered, and it is our job to try and find another technique to stay away from this predictable event. Also it is proven from the previous studies that induced hypotension form the epidural is a better method than other induced hypotension methods that are used [4]. The combination of general anesthesia and epidural anesthesia is wildly used on the modern world even though is not referred as induced hypotension. This method has advantages on the pelvic surgery, because it does not risky reduce arterial pressure but venous pressure and this will significantly reduce blood lose from pelvic vassals. Other methods to induce hypotension (use of nitrosorbiti) have many disadvantages [12], reflector tachycardia ,something that does not happen with epidural anesthesia. Another advantage is reduction of the inhalation anesthesia consumption, and les nausea and vomiting and effective pain control post operatively. In my country this is the first study in wich a combined epidural/general anesthesia was used expilicly for deliberate hypotension as a blood conservation technique in radical cistectomy.

5. Conclusion

Hypotension that occurred as a result of combination of epidural anesthesia with general anesthesia leads to significantly lower blood los levels and lower blood transfusion needs, compared with only general anesthesia on radically cystectomi.

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