

THE IMPACT OF NURSING INTERVENTION ON THE PHYSICAL AND PSYCHOLOGICAL STATUS IN PATIENTS UNDERGOING PACEMAKER IMPLANTATION: AN INTERVENTIONAL STUDY⁺

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Abstract:

Objective : to evaluate the effectiveness of nursing intervention on the physical and psychological status of patients undergoing pacemaker implantation.

Methodology:The population of the study consisted of (59) patients admitted to Al-Kadumia teaching hospital from 15 th of April 2004 to 15 th of March 2005.The sample is divided into the study group (30) patients who received pre-post operative special nursing care by the investigator and the other control group (29) patients received a routine care from the hospital .

Results: The results show that there is statistically highly significant difference between the study and the control groups in sitting and standing from a chair for two minutes two weeks post pacing.The results also revealed that there is a marked improvement in the psychological status of study group as compared to control group.

Recommendation: The investigator recommends, that patients undergone pacemaker implantation must be involved in pre and post implantation teaching program to improve physical and psychological status.

KEY WORDS: Nursing intervention, physical, psychological ,pacemaker implantation

المستخلص

الهدف: تقويم اثر التداخل التمريضي للمرضى المغروز لهم ناظم القلب الاصطناعي على الحالة الجسمية والنفسية المنهجية: تكون مجتمع البحث من (٥٩) مريضا من مرضى ناظم القلب الاصطناعي من مستشفى الكاظمية التعليمي للفترة من الخامس عشر من شهر نيسان ٢٠٠٤ إلى الخامس عشر من شهر ايار ٢٠٠٥ قسمت عينة البحث إلى مجموعة الدراسة وتضمنت (٣٠) مريضا خضع أفرادها للعناية التمريضية المقدمة لهم من قبل الباحثة وتم إعطائهم التعليمات قبل وبعد العملية والمجموعة الأخرى ،المجموعة الضابطة وتضمنت (٢٩) مريضا خضع أفرادها للعناية التمريضية الروتينية المقدمة لهم من قبل المستشفى

النتائج: أشارت نتائج الدراسة الى وجود علاقة ذات دلالة إحصائية عالية بين مجموعة الدراسة والمجموعة الضابطة في الجلوس والوقوف من الكرسي لمدة دقيقتين بعد أسبوعين من عملية الغرز وأشارت نتائج الدراسة الى تحسن واضح في الحالة النفسية لمجموعة الدراسة مقارنة بالمجموعة الضابطة.

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التوصيات :وبناء على هذه النتائج يوصى الباحث بان المرضى الذين يخضعون لعملية غرز ناظم القلب الاصطناعي يجب ان يزجوا في برنامج تعليمي قبل وبعد غرز الناظم لتحسين حالاتهم النفسية والبدنية

Introduction

Permanent pacemakers are implanted to prevent and /or treat bradycardia caused by disorders of the cardiac conduction system. [1]. For more than 15 years, there have been two broad types of pacing systems: single chamber(ventricular) and dual chamber. The selection of either a single- or a dual-chamber pacemaker has clinical and economic implications. Specifically, the known physiological status [1,2] .

The disease has both psychological and physiological effects. The Physiological are associated with pain, limitation of physical activity ,dyspnea, arrhythmias , and sudden death [3,4]. The Psychological status are associated with anxiety ,depression, changes in self- image and loss of self –esteem [3]. In addition to the physiological and psychological problems, there is an additional economic impact on both the patient and the community [5] The main objective of the study is to determine the effectiveness of nursing intervention on the physical and psychological status in patients undergoing pacemaker implantation

Methodology

For the purpose of achieving the 2 aims a quasi- experimental design has been used throughout the present study

The nursing intervention was developed through the review of related literature and previous studies based on the results of assessment of the patients need and assessment of the nurses role. The nursing intervention is designed to provide care for patients who have undergone pacemaker implantation which deal with the nurses intervention in preparing patients undergoing pacemaker implantation such as monitoring and recording vital signs, routine investigation , instructing the patient about relaxation ,deep breathing , heart anatomy and physiology and the simple aspect of pacing procedure. It consists of two parts [3,4]

The first Part is concerned with collection of basic socio demographic and clinical data obtained from the patients or from the patients chart.

The second Part is concerned with data to evaluate the effectiveness of the constructed nursing intervention. The Instruments were used to evaluate the effect of nursing intervention

1- Exercise test: Each patient underwent three simple exercise tests, corresponding to the daily activities of patients. The exercises test was supervised by the same investigator for each patient and followed the same order and the same equipment measurement for all patients .12 leads ECG was performed in supine position using Nihon Kohden machine which had three channels .

Six minute walking :The six minutes walking test is performed in a corridor (22) meters long .This test was performed before pacing ,and two weeks after pacing [5]

Sitting and stand up from a chair patients are asked to stand up and sit down from a standard chair as many times as possible for two minute. This test was performed only for two weeks after discharge[5].

Stair climbing .Patients are asked to ascend and descend stairs as quickly as possible using stairs rail if necessary[5]. This test is performed 2 weeks post discharge. The subjects are asked to do the exercise until they felt that they were physically unable to continue to do more .For these protocol direct cardiac monitoring by 12 leads ECG measure ventricular rate , atrial rate and QT interval ,systolic, diastolic blood pressure, are recorded before and

immediately after each of the exercise test. During the last 10 second of the each exercise test (six minute walking, stand and setting and stair climbing) and then Patients are asked to grade how difficult they have perceived this exertion according to the Borg rating of perceived exertion(RPE)

QT interval analysis

It is done on ECG recording lead II, it is measured from the onset of the QRS to the end of T wave and defined as a return to the T-P baseline In three consecutive cycles were measured in each of the ECG leads recorded at speed of 50 mm\ S and QT interval is corrected with Bazzets

$$\text{formula: } QTC = \frac{QT}{\sqrt{RR}}$$

QT interval ,RR interval ,QT dispersion (QTd) is defined as the difference between the maximum and minimum QT occurring in the three values measured .In any of the ECG leads (QTd max – QTd min), therefore QT corrected dispersion (QTCd) is defined as the difference between maximum QTC and minimum QTC[6].

Borg Scale (Rating of perceived Exertion)(RPE) Subjective feelings of psychologic strain should be considered during both the evaluation and exercise program. The scale has one statement and measured by liker rating scale (very light , Fairly light , hard, very hard) .These rating are scored as 0,1,2 and 3 respectively. The total score of this statement had a range between (0-3)

2-Psychological status (Anxiety and depression scales) A modified standardized questionnaire [7] is used to evaluate the psychological status of patient at the pre pacing and follow up at 2 weeks of pacing .Each scale consisted of 10 statements that allow identifying the presence of anxiety and depression. The scale had three- point type liker rating scale (never, sometime and always). These rating are scored as, 0,1and 2 respectively .The total score of the anxiety and depression had a range between (0-20) .

The sample of the study include all patients who attended Al-Kadumia teaching hospital for first pacemaker implantation during the period from 15 th of April 2004 to 15 th of March 2005 . A total of 100 implantable pacemaker patients were admitted to the hospital during the time of the study period .30 patients did not meet established study criteria, .70 patients met the study criteria and agreed to participate .Thirty five were assigned to the control group and thirty five patients to the study group ,11 patients (7 patients for the control group and 4 patients for the study group) were dropped out of the study for the following reasons 3 refused to continue after participating in the study, 6 didn't complete follow up and 2 had recovery AV block during temporary pacemaker.. A total of 59 patients completed the research study . 30 patients in the study group and 29 patients in the control group

In order to determine the face – validity of the questionnaire, the investigator has distributed copies to experts to give their opinion about items..The reliability estimates for six- minute duration (0.92), for six minute walking distance (0.86).. The study and control groups were selected by reviewing the operation list and then reviewing the patients chart according to the criteria of the study. The patients who met the study criteria were approached the day before the operation and were invited to participate in the study .Objectives were explained to the patient , demographic data, clinical feature scale and scale of depression and anxiety were obtained from the patients, six minute walking were performed for both groups. Teaching materials, which are used in these sessions include models, illustration, discussion and providing patient with written information. The time required for each session (30-35) minutes and (10-15) minutes are required for anxiety and depression scale. ,six minutes walking required (20-30), standing and setting required (10-15) minutes ,and stairs

climbing required (10-15) minute. Patients in the control group of pacemaker implantation had received the regular methods and information by the nurse or other staff members may have verbalized to patients about pacemaker implantation. They also include brief instructions which are provided by the cardiovascular physician., if the patients in the control group ask the investigator questions, they are instructed to refer their questions to appropriate member of the health team, e.g nurse,

Data were analyzed through the use of description statistics (Frequency , Percentage , Mean , Standard deviation) and inferential statistics (T-test ,Kilmogrove Smirnov ,Z-test ,Binomial test).

Results

It appears from table-1-that the highest percentage (30%) of study group was within the age group (61-70) years similarly ,the highest percentage of the control group (31.03%) was within the age group (61-70) years. The mean age was (57.67 – SD 15.07) for the study group while, the mean of age (61.55 - SD10.45) for the control group. Statistically there is no significant difference between study and control groups $P > 0.05$

Table -1- Sociodemographic characteristic of the study and control groups

Characteristics	Study group		Control group		C.S
	NO	%	NO	%	
1-Age					* $X^2=4.92^{**}$ P=0.55 (N.S)
21-30	2	6.66	1	3.44	
31- 40	1	3.33	1	3.44	
41-50	5	16.66	5	17.24	
51-60	7	23.33	8	27.58	
61-70	9	30	9	31.03	
71-80	5	16.66	4	13.79	
81-90	1	3.33	1	3.44	
Total	30	100	29	100	
Mean SD	57.67 15.07		61.55 10.45		T t-test =1.15 P=0.26 (N.S)
2-Sex					$X^2=1.41$ P=0.18 (N.S)
Female	14	46.7	18	62.1	
Male	16	53.3	11	37.9	
Total	30		29		

X*= Chi- Squire, **No significant at P value > 0.05 , C.S= comparison significant

Table 2 Comparisons between the study and control groups with implantable pacemaker patients by hemodynamic response (ECG and systolic, diastolic blood pressure) at rest before pacing and 2 weeks post pacing

Hemodynamic		Study group n=30					Control group n= 29					C.S(t-test depedent of 2weeks post pacing for study & control group
		Pre pacing		2 weeks post pacing		C.S(t-test depedent of pre pacing & 2weeks post pacing	Pre pacing		2 weeks post pacing		C.S(t-test depedent of pre pacing & 2weeks post pacing	
		Mean	SD	Mean	SD		Mean	SD	Mean	SD		
ECG	VR	59.80	22.15	84.23	14.9	P=0.00 (H.S)	52.76	17.36	84.89	22.09	P=0.00 (H.S)	P=0.89 (N.S)
	AR	107.20	26.97	104.23	20.91	P=51 (N.S)	112.31	34.56	95.55	24.18	P=0.05 (S)	P=0.15 (N.S)
	Q Tmin	393.26	65.72	363.36	35.9	P=0.45 (N.S)	379.7	54.07	365.05	41.09	P=0.190 (N.S)	P=0.87 (N.S)
	Q Tmax	443.66	88.66	410.92	42.7	P=0.05 (S)	432.09	60.77	407.62	50.19	P=0.047 (S)	P=0.89 (N.S)
DBP		81.33	12.99	80.33	14.73	P=0.73 (N.S)	90.7	10.33	91.38	8.75	P=0.60 (N.S)	P=0.001 (H.S)
SBP		134.50	16.41	137.00	19.67	P=45 (N.S)	151.37	18.07	148.96	11.75	P=0.55 (N.S)	P=0.007 (H.S)

H.S=highly significant, N.S= no significant, SD=Stander division, VR=Ventricular rate, AR=Atrial rate, QTmin= QTminimum, QT= QT maximum, DBP= Diastolic blood pressure, SBP=systolic blood pressure.C.S= comparison significant obtained by using paired t-test. and t-test for concidence of means between two independent sample

It appears from the table (2) that there is a significant difference between pre pacing and two weeks post pacing related to increase in ventricular rate, and decrease in QT maximum for the study and control groups and there is no significant difference between pre pacing and two weeks post pacing related to systolic and diastolic blood pressure for the study and the control groups. .

Table- 3- Comparison between the study and the control groups with implantable pacemaker patients by complete six minutes walking and period of follow up

Distance(matters) complete six minute duration	Study group				Control group				C.S between study and control groups during pre pacing	C.S between study and control groups during post pacing
	Before pacing		2 Weeks after pacing		Before pacing		2 Week after pacing			
	Freq	%	Freq	%	Freq	%	Freq	%		
175 -200	2	25	0	0	0	0	1	7.14	P=0.33 (N.S)	P=0.33 (N.S)
201-250	1	12.5	0	0	0	0	0	0	P=0.33 (N.S)	0
251-300	5	62.5	2	9.09	2	66.66	0	0	P=0.008 (N.S)	P=0.33 (N.S)
301-350	0	0	19	86.36	1	33.33	7	50	P=0.33 (N.S)	P=0.01 (S)
351 and above	0	0	1	4.54	0	0	0	0	0	P=0.033 (N.S)
Total	8	100	22	100	3	100	14	100	P=0.09 (N.S)	P=0.05 (S)

C.S=Comparison significant obtained by using Binomial test, Freq= frequency, S= significant, N.S= no significant

It appears from the table (3) that there is no statistical significant difference between the study and control groups in six minutes walking pre pacing in distance 175 m and above .The table (3) also revealed that the health status of the study group is better than that of the control group in pre pacing as (8) patients are able to walk 175 m and above in six minutes. As for the control group (3) patients are able to walk 175 m and above in six – minutes.

Regarding six minutes walking post pacing (22) patients of the study group are able to walk 175 m and above in six minutes while (14) patients are able to walk 176 m and above in six minutes of the control group.

There is no statistical significant difference between the study and control groups in six minutes walking 2 weeks post pacing in distance 175 m and above except distance (301 and 350) m and the total number of patients who complete six- minutes walking statistically significant difference increase in the study group than that control group .

Table 4 Comparison between study and control groups with implantable pacemaker patients of performance completed exercise test during 2 weeks post pacing

Exercise test	Study group		Control group		C.S by K.S-test
Six minute walking	F	%	F	%	
	22	73.33	14	48.28	1.97 (S)
22 steps climbing or above in 2 minute	21	70	20	68.97	0.09 (N.S)
Sitting and standing 2 minute	26	86.67	14	48.28	3.38 (H.S)

Study group=30 ,Control group= 29,C.S*=Comparative significant ,K.S** =Kilmogerve seamier nova

H.S= highly significant, N.S= non significant S= Significant

The table (4) shows that a high significant difference and significant difference between the study and the control groups in exercise tests (sitting and standing for two minutes ,six minutes walking) for two weeks post pacing.

The same table shows that there is no significant difference between the study and the control groups in two minutes stair climbing for two weeks post pacing

Table 5-Comparison between study and control groups with implantable pacemaker patients before and after climbing and hemodynamic responses (for 2weeks post implantation)

Groups	Study group					Control group					c.s between control & study after climbing
	2weeks post pacing					2weeks post pacing					
homodynami c responses	Before climbing		After climbing			Before climbing		After climbing			
	mean	SD	mean	SD	c.s between before & after climbing	mean	SD	mean	SD	C.S Between Before & after climbing	
VR	83.89	15.04	84.48	14.87	P=0.73 (N.S)	84.89	22.09	87.31	16.67	P=0.46 (N.S)	P=0.44 (N.S)
AR	103.34	20.70	105.27	24.93	P=0.39 (N.S)	95.55	24.17	112.58	27.70	P=0.13 (N.S)	P=0.10 (N.S)
QTd	46.20	23.36	42.75	23.73	P=1.00 (N.S)	44.13	6.06	38.62	22.36	P= 0.68 (N.S)	P=0.17 (N.S)
QTCd	50.98	18.38	50.88	29.54	P=0.98 (N.S)	47.35	32.44	46.86	20.06	P=0.81 (N.S)	P=0.26 (N.S)
DBP	80.44	14.99	87	14.65	P=0.009 (H.S)	91.37	8.75	93.44	8.13	P=0.16 (N.S)	P=0.009 (H.S)
SBP	137	19.67	147.24	18.49	P=0.00 (H.S)	148.96	11.75	157.24	10.65	P=0.00 (H.S)	P=0.000 (H.S)
RPE			1.93	0.79				2.07	0.75		P=0.52 (N.S)

H.S=highly significant, N.S= no significant, SD=Stander division ,VR=Ventricular rate, AR=Atrial rate, QTd= QT dispersion, QTCd=QT corrected dispersion , DBP= Diastolic blood pressure, SBP=systolic blood pressure, RPE= rating perceived exertion ,C.S= comparison significant obtained by using paired t-test. and t-test for concidence of means between two independent sample

It appears from table 5-that there is increased in mean of ventricular rate and atrial rate before and after stair climbing for the study and the control groups for two weeks post pacing.

Table 6- comparison between study and control groups with implantable pacemaker patients before and after sitting and standing and hemodynamic responses (for 2weeks post implantation)

Groups	Study group = 30 2 week post pacing					Control group =29 2 week post pacing					C.S test between study and control groups after sitting and standing
homodynamic responses	Before sitting and standing		After sitting and standing		C.S Between before & after sitting and standing	Before sitting and standing		After sitting and standing		C.S Between Before & after sitting and standing	
	mean	SD	mean	SD		Mean	SD	mean	SD		
VR	83.89	15.04	97.86	21.18	P=0.00 (H.S)	84.89	22.09	87.31	16.67	P=0.04 (H.S)	P=0.33 (N.S)
AR	103.34	20.70	119.4 82	23.032	P=0.00 (H.S)	95.55	24.17	120.20	27.38	P=0.00 (H.S)	P=0.91 (N.S)
QTd	42.75	23.73	40.66	15.29	P=0.68 (N.S)	44.13	6.06	37.24	14.85	P=0.81 (N.S)	P=0.32 (N.S)
QTCd	51.54	18.15	50.88	29.54	P= 0.90 (N.S)	47.35	32.44	46.86	20.06	P=0.94	P= 0.26 (N.S)
DBP	80.44	14.99	85.86	16.80	P=0.03 (H.S)	91.37	8.75	94.13	6.27	P=0.16 (N.S)	P=0.01 (H.S)
SBP	137	19.67	145.5 1	25.85	P=0.30 (N.S)	148.96	11.75	157.93	9.40	P=0.00 (H.S)	P=0.03 (H.S)
RPE			1.55	0.73				2.07	0.75		P=0.12 (N.S)

H.S=highly significant, N.S= no significant, SD=Stander division ,VR=Ventricular rate, AR=Atrial rate, QTd= QT dispersion, QTCd=QT corrected dispersion, DBP= Diastolic blood pressure, SBP=systolic blood pressure, RPE= rating perceived exertion ,C.S= comparison significant obtained by using paired t-test. and t-test for concidence of means between two independent samp

Table 6- shows the effect of the exercise test for the patients with implantable pacemaker by (sitting and standing from a chair) , and homodynamic status. The results show increase in mean of ventricular rate and atrial rate before and after sitting and standing for the study and the control groups for two weeks post pacing. Decreased in mean of QTd and QTCd before and after sitting and standing from a chair for both study and the control groups . It also shows increase in mean of systolic and diastolic blood pressure before and after sitting and standing for the study group and control group.

Table –7-Mean, SD, and t-test values of psychological status for the study and control groups with pacemaker implantation pre pacing and two weeks post pacing

Psychological status	Group	Study group		t-test	P-value	Control group		t-test	Comparative significant
	Period of follow up	Mean	SD			Mean	SD		
Depression scores	Pre pacing	12.93	5.39	5.645	H.S	12.51	5.200	1.03	(N.S)
	Two weeks post pacing	4.93	4.52			11.34	3.18		
Anxiety scores	pre pacing	14.13	4.014	8.01	H.S.	14.34	4.418	1.63	(N.S)
	Two weeks post pacing	5.63	4.25			7.89	3.34		

H.S=highly significant, N.S= no significant, SD=Stander division

It appears from the table- 7- there is highly significant difference between prepacing and two weeks post pacing in depression and anxiety for the study group but there is no significant difference between pre pacing and two weeks post pacing for the control group

Discussion

It appears from data analysis that the age groups for patient who are undergoing pacemaker implantation were frequently from (51-60) and (61-70) (table 1) .This means that the age groups most usually affected are old age. This anticipated frequency of complete heart block increasing with age . The same findings are mentioned that the age distribution of older patients (>64 years) who received implantable cardiac pacemakers in non-federal US hospitals. They also reported that the people who are 65 years of age and older received replacement pacemaker pulse generators(8,9).

Evaluating tolerance for the exercises

The investigation of the effectiveness of the nursing intervention in patients undergoing pacemaker implantation is done through the comparing hemodynamic measurement before and after six minutes walking in pre pacing , and two weeks post pacing. The study revealed a statistically significant difference between study and control groups related to an increase in the ventricular rate ,and a decrease in QT maximum and there is high statistically significant difference in diastolic and systolic blood pressure as shown in (table 2) The data analysis revealed that the study group had benefited from the nursing intervention through out the improvement in hemodynamic measurement after six minutes walking during a period of follow up. The results supported by another study who stated that the increase in ventricular pacemaker rates during exercise has shown improved hemodynamic and exercise tolerance[5].

There is a high significant difference and significant difference between the study and the control groups in exercise tests (sitting and standing or two minutes six minutes walking) for two weeks post pacing (table 5) and through the

hemodynamic that there is a high statistically significant difference in systolic blood pressure before and after sitting and standing from a chair for two minutes and before and after stair climbing for the study and control groups (table 5,6). Prescribed exercise or physical activities for individuals with rate – responsive pacemakers , direct measurements vital signs estimation of energy expenditure would seem prudent ,as the energy requirements of activities of daily living may not be accurately estimated by the compendium. Those results indicated improvement of exercise capacity for both study and control groups but nursing intervention played more vital and essential part in such improvement [8]

Psychological status

Psychological preparation typically is given before pacemaker implantation to facilitate the patients adaptation and recovery [9]. Patients who received nursing intervention demonstrated improvement in their psychological status than patients in the control group .Statistically highly significant difference between pre and two weeks post pacing in depression and anxiety for the study group table (7) .It was expected that confidence in the pacemaker would decrease after learning that the product had been recalled [9,10]. The fact that patients needed to come back to be checked after 2 weeks. This findings suggested that patients and family need reassurance that their device is functioning to work properly and that health team members will continue to monitor it carefully. Patients who continue to have many symptoms pre pacing and two weeks post pacing may feel that they are not recovering and become discouraged and depressed .On the other hand, those who are depressed may experience symptoms such as anorexia, palpitations, which may contribute negatively to their state of health

We can conclude that the effectiveness of nursing intervention can be clearly observed in the difference between the study and control groups after walking two weeks post pacing concerning systolic and diastolic blood pressure and rating perceived exertion and the health status of the study group is better than that of the control group .

Recommendations

From the findings of this study the investigator recommends the following :

- 1-A careful assessment and a special care is to be taken of patients who underwent implantable pacemaker .
- 2- Reinforcement of education during the follow up period concerning the patients 'needs.

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