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N Terminal prohormone brain natriuretic peptit level in patients with arhythmia

Aritmili hastalarda n terminal prohormon brain natriüretik peptid düzeyi

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Abstract

Objective: Brain natriuretic peptides are the marker protein structures released in response to wall tension from ventricular myocytes, and have been increasingly used in recent years. The use of N-Terminal Prohormone Brain Natriuretic Peptide is getting more expanded in acute heart failure, left ventricular diseases and acute dyspnea. Here, we aimed at investigating the level of N-Terminal Prohormone Brain Natriuretic Peptide in patients diagnosed with arrhythmias.

Materials and Methods: Patients admitted to the emergency department and with any rhythm disorder were included into this study. Bedside echocardiography was performed for each patient. Patients were classified into two groups with and without heart failure. Blood samples of 1 cc were drawn from patients and put into ethylene diamine tetraacetic acid (EDTA)-containing tubes, and N-Terminal Prohormone Brain Natriuretic was investigated. Collected data were recorded into the prepared forms. Statistical analyses were performed with SPSS for Windows 13.0 software package. While average N-Terminal Prohormone Brain Natriuretic level was 25100±10955 pg/Ml in patients with heart failure, average level of N-Terminal Prohormone Brain Natriuretic was seen as 5767.61±6225 pg/mL in those with any rhythm disorder but no heart failure. Brain Natrıuretıc Peptıt And Arhythmia

Conclusion: N Terminal Prohormon Brain Natriüretik Peptid are important markers in the diagnosis of acute heart failure. In recent years, studies on their association with other diseases have become widespread. In our study, we also found BNP levels more than normal ranges in patients with arrhythmia but no cardiac failure, as well as finding N-Terminal Prohormone Brain Natriuretic levels at higher rates in heart failure patients with dysrhythmia.

Keywords: Arhythmia; N-Terminal Prohormone Brain Natriuretic; Heart Failure.

Öz

Amaç: Brain Natriüretik Peptid (BNP) ventriküler miyositlerden duvar gerilimine yanıt olarak salınan protein yapılı belirteç olup son yıllarda kullanımı gittikçe artmaktadır. Akut kalp yetmezliğinde, sol ventrikül hastalıklarında akut dispnede kullanımı yaygınlaşmaktadır. Bu çalışmada amaç; aritmi tespit edilen hastalarda BNP düzeyi araştırılmıştır.

Gereç ve Yöntemler: Bu çalışmaya Acil servisimize başvuran ve herhangi bir ritm bozukluğu olan hastalar dahil edildi. Hastalara yatak başı EKO yapıldı. Hastalar kalp yetmezliği olan ve kalp yetmezliği olmayan hastalar olarak iki grupta sınıflandırıldı. Hastalardan alınan 1 cc kan Etdalı tüpe alınarak N Terminal Prohormon Brain Natriüretik Peptid (NT pro BNP) bakıldı. Toplanan veriler önceden hazırlanan formlara kaydedildi. İstatistiksel analizler "SPSS for Windows 13.0'' programı yardımıyla yapıldı. Kalp yetmezliği olan hastalarda ortalama BNP düzeyi 25100±10955 pg/mL iken, kalp yetmezliği olmayan herhangi bir ritm bozukluğu olan hastaların ortalama BNP düzeyi 5767,61±6225 pg/mL olarak tespit edildi.

Sonuç: BNP ve NTpro BNP akut kalp yetmezliğinin tanısında kullanılan önemli belirteçlerdir. Son yıllarda başka hastalıklarla ilgisi konusunda çalışmalar yaygınlaşmıştır. Bizim çalışmamızda kalp yetmezliği olan disritmili hastalarda yüksek tespit edilmesi yanında kalp yetmezliği olmayıp herhangi bir aritmi tespit edilen hastalarda da normal sınırların üstünde tespit edilmiştir

Anahtar Kelimeler: Aritmi; Brain Natriüretik Peptid; Kalp Yetmezliği.

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INTRODUCTION

From neurohormones released into blood stream during heart failure (HF), atrial natiuretic peptide (ANP), brain natriuretic peptide (BNP) and C-type natriuretic peptide (CNP) are coded by different genes. Among these peptides, ANP and BNP are known as cardiac hormones released into the circulation. CNP mostly functions as a local hormone and exists most in central nervous system and vascular endothelium structures. However, dendroaspice natriuretic peptide (DNP) has been isolated from human plasm in recent years, and its function in humans still remains unclear (1).

BNP is a neurohormone consisting of 32 amino acids. It is mainly synthesized in ventricules, (in left ventricule at a higher rate), stores there released through this way, and to a lesser degree, also synthesized in atriums and brains where it was first described (so, term of brain-NP was used previously). First, prepro-BNP including 132 amino acids is synthesized and then converted into proBNP including 108 amino acids. ProBNP is degraded into active BNP and inactive N-terminal proBNP (NT-BNP) including 76 amino acids through proteolysis (2).

BNP and NT-proBNP are pulsatively released into the circulation via the increase in ventricular tension and myocytes stimulated by various neurohormonal factors and to a lesser degree, probably and a little directly coronary sinuses from fibroblasts in myocardial area. Half life of BNP is short (nearly 20 min) while half life of NT-proBNP is longer (nearly 90 min) (3).

Physiological factors such as age, gender and body weight influence the plasm levels of both BNP and NT-proBNP. Along with advancing age, the plasm levels of both BNP and NT-proBNP increase probably due to cardiac changes. Compared with men, both BNP and NT-proBNP levels are a little higher in women probably due to hormonal factors. In addition, BNP levels are 30-50% lower in obese individuals, compared to those with body mass index of 23-25 (BMI) due to decreased BNP levels and increased BNP clearance. Given all these factors, normal values may be accepted as <100 pg/mL for BNP and <125 pg/mL for NT-proBNP (<450 pg/mL for 75 years of age) (4).

BNP is a neurohormone playing a key role in volume homeostasis. BNP is also a delicate sign of ventricular dysfunction in symptomatic and asymptomatic patients, and its higher threshold is related to severity of dysfunction (5). The fact that point-of-care measurement of BNP is easy-to-use facilitates its applicability in emergency rooms and in-patient clinics (6). The use of BNP and NT-BNP has been becoming increased in recent years in order to diagnose heart failure (HF) swiftly and accurately in emergency rooms (7). Apart from acute HF, the use of BNP and NT-BNP is also getting increased in acute dispnea and disorders of left ventricule.

In the present study, we aimed at showing the importance of NT-BNP levels in arrhythmias comparing NT-BNP levels of patients with and with no HF diagnosed with arrhythmias in emergency room.

MATERIALS and METHODS

An approval was obtained for the study from the ethical board of Meram Medical School of Selcuk University. Patients admitted to the emergency room and diagnosed with any rhythm disorders were included into the study. Written consent forms were obtained from all patients.

Those with known chronic renal failure, anemia, diabetes mellitus and history of hypertension were excluded from the study. Those with acute heart failure were also excluded out of the criteria. Bedside echocardiography (ECO) was performed for all patients, and those diagnosed with any rhythm disorders were included. The patients with arhythmia were classified into two groups as those with and without HF. The patients with chronic heart failure (CHF) and acute disorders, such as shortness of breath, orthopnea, paroxismal nocturnal dispnea, decrease in exercise tolerance, fatigue, exhausting, elongation of duration for recovery after exercise, swellings on ankles, increase in jugular vein pressure, hepatojugular reflux, leftward-shifted cardiac apex beat, murmure in heart sounds and lower left ventricular ejection fraction,were included into the group with HF. These patients were evaluated under the Heart Failure Criteria of European Society of Cardiology (2012). Although the reference interval of NT-BNP is 128 pg/mL, the interval was accepted as 450 pg/mL in the study because of consistency with literature and no age limit. The values over 450 pg/mL were evaluated as pathologic.

During initial evaluations, a blood sample was collected into tubes containing potassium ethylenediaminetetraacetic acid. The BNP was measured in triplicate using the Triage B-Type Natriuretic Peptide test (Biosite Inc., San Diego, California). The Triage BNP test is a fluorescence immunoassay 3tandar quantitative determination of BNP in whole blood and plasma specimens.

Statistical analysis

All data were analyzed with SPSS for Windows 13.0 software package programme, and NT-proBNP values of patients with and with no HF were compared. The Mann-Whitney U test was used for in-group comparisons. $P<0.05$ was accepted to be significant.

RESULTS

A total of 31 patients were included into the study. Study participants were chosen among those admitted to the emergency and diagnosed with rhythm disorder on ECG. The rate of men to women patients was 16/15. Of all patients, six was previously diagnosed patients with HF while 25 patients showed no signs of HF on echocardiography performed during the study. Mean age rates of patients with and with no HF were 61.2±22.8 and 65.7±17.4, respectively. While mean NT-

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BNP level was found as 25100±10955 pg/mL in patients with congestive heart failure (CHF), the level was determined as 5767.61±6225 pg/mL in those without CHF. The patients with CHF displayed atrial fibrillation (AF) (n=11), supraventricular taschicardia (SVT) (n=1), sinüs taschicardia (n=1) 2 and sinüs bradycardia (n=1). The lowest rate of NT-BNP was determined in the patients with sinüs bradicardia, and this rate was found as 593 pg/mL. Levels of NT-BNP were found to be higher than normal values in both groups and all types of arrhythmia ($p<0.05$).

DISCUSSIONS

As well as the known beneficial use of B-type natriuretic hormone and NT-BNP in emergency rooms, it is known that addition of clinical findings also contribute to the process while establishing a final diagnosis.

Brain natriuretic peptide shows a high specifity and sensitivity in HF (8). In many studies, the superiority of BNP has been shown in the evaluation of left ventricular ejection fraction (LVEF) in chronic HF (9). In recent years, many studies have been conducted to indicate the significance of BNP in the assessment of HF in patients admitted to emergency with the complaint of dispnea.

In a study performed by Januzzi et al. İn 2005 (10), it was seen that high score of NT-BNP was significantly reliable in the diagnosis of 599 patients with acute HF admitted with the complaint of dispnea, compared to clinical diagnosis, and the togetherness of high score of NT-BNP and clinical diagnosis was more superior than either high score of NT-BNP or clinical diagnosis alone.

In a prospective randomized controlled study where cost-effectiveness was investigated, 452 patients admitted to emergency with the complaint of dispnea were grouped into two. In this study, BNP was compared with other 140tandard methods in the evaluation od HF diagnosis, and use of BNP in emergency was detected to decrease total cost and to shorten hospital stay (11). While the number of studies investigating the importance of BNP in HF is getting increased, comprehensive studies related to the degrees of BNP in arrhythmias are yet to be encountered.

In a study performed by Dell'era et al. (12), BNP levels were reported to be higher in AF patients than those in normal sinüs rhythm and AF patients in whom cardioversion was performed.

In the study by Kallergis et al. (13), it was reported that while NT-pro-BNP levels were higher in patients with AF, levels of NT-BNP were significantly decreased after electrical cardioversion.

Studies investigating BNP levels in arrhythmias have remained limited with AF. In our study, it was seen that BNP levels were significantly higher in those with HF among dysrhythmic patients, as consistent with literature. However, although NT-pro-BNP levels in patients without HF were found to increase less than those with HF, a significant higher difference was observed when our finding was compared with the reference interval in literature.

Differential diagnosis of patients admitted to emergency rooms with the complaint of breath shortness should be performed with an accurate and rapid investigation. Mistakenly diagnosed cases and loss of time lead to increased rates of mortality, morbidity and cost-effectiveness (14). In this context, the measurement of plasm BNP levels, the most sensitive and specific sign of cardiac dysfunction, will facilitate the follow-up process of inpatients in clinics and those in emergency rooms.

In conclusion, mean 100 pg/mL for BNP and mean 900 pg/mL for NT-BNP should be used as mean threshold values in the diagnostic assessment of HF in emergency rooms, and final diagnosis should be done together with radiographic and clinical findings by taking into consideration the factors increasing or decreasing BNP levels such as advanced age, BMI, anemia and renal dysfunction. It should be kept in mind that NT-pro-BNP levels are important not only in acute HF, but also in arrhythmias and other conditions related to left ventricule. We consider that further larger sample size studies are needed to clarify this issues

REFERENCES

1. Cheung BM, Kumana CR. Natriuretic peptides-relevance in cardiac disease. JAMA 1998;16:280(23)1983-4.
2. Witthaut R. Science review: natriuretic peptides in critical illness. Crit Care 2004;8(5):342-9.
3. Mueller T, Gegenhuber A, Poelz W, Haltmayer M. Diagnostic occuracy of B type natriuretic peptide and amino terminal proBNP in the emergency diagnosis of heart failure. Heart 2005;91(5):606-12.
4. Alan S Maisel, James McCord, Richard M Nowak et al. Bedside B-Type natriuretic peptide in the emergency diagnosis of heart failure with reduced or preserved ejection fraction: Results from the Breathing Not Properly Multinational Study. J Am Coll Cardiol 2003;4:41(11):2010-7.
5. Cowie MR, Mendez GF. BNP and congestive heart failure. Prog Cardiovasc Dis 2002;44(4)293-321.
6. Maisel AS, Krishnaswamy P, Nowak RM ve ark. Breathing Not Properly Multinational Study Investigators. Rapid measurement of B-Type natriuretic peptide in the emergency diagnosis of heart failure. N Engl J Med 2002;347:161-7.
7. Mueller C, Frana B, Rodriguez D, Laule-Kilian K, Perruchoud AP. Emergency diagnosis of congnestive heart failure: impact of signs and symptoms. Can J Cardiol 2005;21:921-4.
8. Krüger S, Hoffmann R, Graf J, Janssens U, Hanrath P. Brain natriuretic Peptide. Diagnostic and prognostic value in chronic heart failure. Med Klin (Munich) 2003;15:98(10)562-7.
9. Lee SC, Stevens TL, Sandberg SM, Heublein DM, Nelson SM, Jougasaki M, et al. The potential of brain natriuretic peptide as a biomarker for New York Heart Association class during the outpatient treatment of heart failure. J Card Fail 2002;8(3):149-54.
10. Januzzi JL Jr, Camargo CA, Anwaruddin S, Baggish AL, Chen AA, Krauser DG, et al. The N-terminal Pro-BNP

2016;23(2):138-41
DOI:10.5455/jtomc.2015.12.053

investigation of dyspnea in the emergency department (PRIDE) study. Am J Cardiol 2005;95(8):948-54.
11. Mueller C, Scholer A, Laule-Kilian K, Martina B, Schindler C, Buser P, et al. Use of B-type natriuretic peptide in the evaluation and management of acute dyspnea. N Engl J Med 2004;350:647-54.
12. Dell'era G, Rondano E, Franchi E, Marino PN Atrial asynchrony and function before and after electrical cardioversion for persistent atrial fibrillation. Eur J Echocardiogr 2010;11(7)577-83.
13. Kallergis EM, Manios EG, Kanoupakis EM, Mavrakis HE, Goudis CA, Maliaraki NE et al. Effect of sinus rhythm restoration after electrical cardioversion on apelin and brain natriuretic Peptide prohormone levels in patients with persistent atrial fibrillation. Am J Cardiol 2010;105(1):90-4.
14. Duygu H, Türk U, Zoghi M, Nalbantgil S. Plazma B-tipi natriüretik peptid düzeylerinin kardiyovasküler hastalıklardaki yeri ve önemi. Anadolu Kardiyoloji Dergisi 2005;5:305-11.