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Benefits of Troponin T in Chronic Hemodialysis

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Abstract

In chronic hemodialysis patients, the risk of developing heart disease is significant; cardiovascular diseases are responsible for a significant number of deaths. Diagnosis of cardiac damage is often difficult in these patients because cardiac damage biomarkers such as troponin T may be incidentally elevated.

The link between cardiac involvement and the elevations seen in this population is poorly defined. Prospective study including 105 patients; 55 men (52.3%) and 50 women (47.6%), whose average age is 43.19 years, 52% of this population are hypertensive, 47% are diabetics, 45% are smokers, 19 patients had a history of heart disease and 49% have dyslipidemia. ECG and echocardiography were performed routinely in the entire study population as well as a complete laboratory workup including a routine laboratory workup and cardiac marker: troponin T.

Patients in Group I of the ECG results are correlated with the level of troponin T: 85.3%without cardiac involvement, 15.8% aves cardiac injury. for group II patients the ECG findings are correlated with the level of troponin T without cardiac 11.5% vs.88.5% with cardiac involvement.

This study confirms that the level of Troponin T is frequently elevated in chronic hemodialysis patients, even in the absence of obvious cardiac involvement. A number of cardiovascular risk factors may be correlated with this elevation and may constitute independent prognostic markers in these patients.

Keywords: Troponin, Chronic hemodialysis, Cardiac involvement.

INTRODUCTION:

Cardiovascular disease is the main cause of mortality in patients with chronic kidney disease (CRF) and CRF is an independent predictor for an unfavorable course of acute coronary syndrome (ACS)

Cardiac troponin remains a marker of choice for the diagnosis and risk stratification of acute coronary syndrome (ACS). The concentration of this parameter may be found to be increased in

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extra-cardiac conditions and in particular in end-stage renal disease, and the debate on this variation is still ongoing [1, 2]. Is this a cardiac attack secondary to this pathology (especially since the risk of developing coronary heart disease is high in hemodialysis patients) or quite simply a false positive troponin in connection with the kinetics of its elimination.

The N-terminal proBrain Natriuretic Peptide (NT-pro BNP) essential biological marker of heart failure is influenced by renal function, in fact, its concentration has been reported to increase with the concentration of creatinine. This increase in renal insufficiency may be due either to a defective elimination (false positive) or to an effective increase in the release of this peptide following cardiomyopathy outside or following renal damage [3]; in

Indeed, it is already accepted that renal insufficiency presents a significant cardiovascular morbidity in relation to left ventricular hypertrophy, due in part to anemia, hypervolemia by sodium retention and arterial hypertension.

Troponin and NT-ProBNP are two complementary cardiac markers that identify groups at high risk of mortality in ACS patients, decision values as specified above are affected by renal function.

Materials and methods:

This work consists of a prospective study on 105 patients with end-stage chronic renal failure treated by hemodialysis at a rate of 3 sessions. Their routine cardiological follow-ups were provided by hemodialysis center in Marrakech.

All the patients underwent a clinical and paraclinical cardiological examination (echocardiography, ECG, complete biological assessment); also listed the cardiovascular risk factors (dyslipidemia, diabetes, arterial hypertension, etc.) for each patient.

Concerning the biological assessment, in addition to troponin T, the following biological parameters in summer measured before dialysis: creatinine, urea, lipid balance, glycemia, blood count.

Non-consenting patients and those with acute renal failure were excluded from the work.

Results:

During this period, all age groups are concerned with an average of 43.19, with male predominance with a sex ratio M / F of 1.1, 19 patients present with ATCD of cardiac pathology or 18%.

52% of this population are hypertensive, 47% are diabetics, 45% are smokers, 49% have dyslipidemia and 30% have pathological auscultation.

All patients underwent echocardiography. The results are the following:
v Normal echocardiography: 47 patients or 45% of echocardiograms performed.
v Pathological echocardiography: 58 patients, or 55% of echocardiography performed.

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The electrocardiogram was performed systematically in the entire study population, 43% had a normal trace and 57% had abnormalities distributed as follows (Table 1):

Electrocardiogram abnormalities	**Percentage**
leftventricularhypertrophy	31%
Right ventricular hypertrophy	23%
Conduction disorders	8%
ST segment abnormalities	6%

biological marker	Results
Hemoglobin	Average=10,3 g/dl
Total cholesterol	Average=1.63 g/l
LDLc	Average= 0.79 g/l
HDL	Average= 0.47 g/l
Triglyceride	Average= 1.41 g/l
Urea	Average= 1.60 g/l
Creatinine	Average= 89,30 mg/l
Glycemia	Average= 0.89 g/l

Table 2: Data from laboratory tests in the study population

The mean value of troponin T within the series is 0.04 +/- 0.059,

The patients in the series were subdivided into two groups:

- Group I with a negative troponin T
- Group II with a positive troponin T

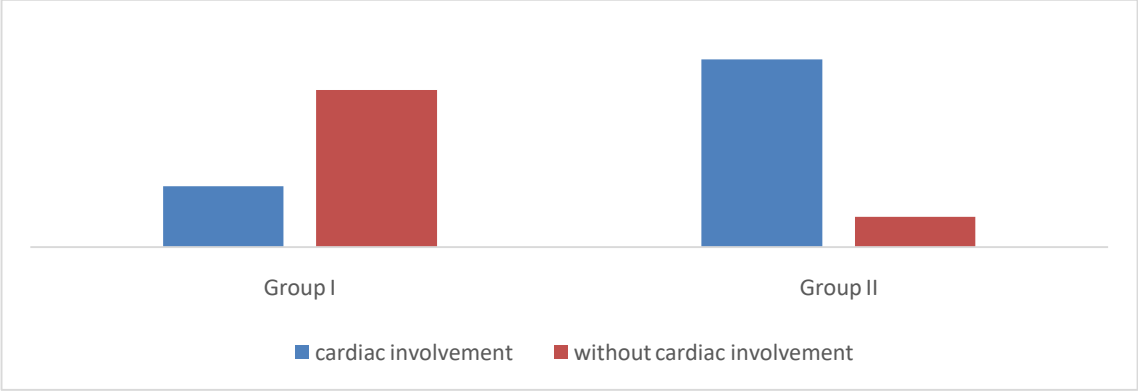

Figure1: Correlation between echocardiography data and Troponin T

Regarding the echocardiogram data, there is a relationship between Troponin T and the ECG abnormalities observed in the two groups (Table 3)

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ECG data	Group I T-	Group II T+
Normal	85,3%	11,5%
Anomalie d'ECG	15,8%	88,5%

Discussion:

The clinical significance of elevated troponin T in a hemodialysis patient apart from any cardiac episode is still debated. These last years of many studies have reported troponin levels above the values of reference in a large number of hemodialysis patients without evidence of acute coronary syndrome. In 1994, Haffner et al [4] were the first to describe this elevation. Subsequently, it was discovered that this first dosage generation of TnTs cross-reacted with muscle troponins skeletal, possible uremic toxicity affecting muscle in chronic hemodialysis couldbe advanced to explain this elevation. Ricchiuti et al [5], have shown that second-generation TnT assays no longer exhibited this reaction cross. Finally, third generation assays of TnTs were developed and the specificity was further enhanced. The technique used for dosage of troponin T in patients in the series of our study belongs to this third generation. The results reported that 57% of the collective unselected hemodialysis patients experienced an elevation of serum TnT, and that 14% had rates above the threshold indicative of myocardial infarction. These results are comparable to those reported in the literature for groups similar [4], however, Apple et al. [6] reported, in 2004, an85% of elevations exceeding 0.01 ng/ml.

In view of our results, the interpretation of an elevation of TnTs above normal in a patient on chronic dialysis remains difficult. This deduction has already been made by other authors[12]. It would be useful to think of a relative decision threshold for labeling an acute coronary syndrome in uremic patients and which would be higher than that retained for patients with arenal preserved. This value would be determined over a larger series of chronic hemodialysis so that it can be taken as a diagnostic decision reference. It's in the meaning that this study, the preliminary results of which we have just presented, will to continue by our team in the rest of the chronic hemodialysis not yet explored on the map heart rate and which are already 127 recruits, which will bring the series to 200patients.

This kind of precaution for determining the special chronic hemodialysis threshold has already been proposed in other studies [7]. We can also consider the use of aindividual reference threshold for each chronic hemodialysis patient and which will serve as basis for decision making, this value would be for example the rate of a dosage annual troponin in the patient and any significant change should prompt to an exploration in the sense of the SCA.

To explain this rise in blood levels of TnT without events columnar, many hypotheses have been mentioned. It's about there-expression of fetal cardiac troponins T in striated muscle due to the "toxicity" of uremic syndrome and/or associated inflammation. It could be also resulting of microlesions of the heart muscle "minimal myocardial injury". These microlesions could be induced by different mechanisms such as the occurrence of small subclinical myocardial infarctions, muscle distension cardiac saline overload, left ventricular hypertrophy, or the

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"toxicity" of uremic syndrome [8,9]. Collinson et al. evoked a nimpaired clearance of TnTs in chronic renal failure, but not no significant correlation was found between TnT levels and the severity of renal failure [10].

Other parameters influence the plasma values of TnT, it would be useful then to take them into consideration even more expensive the chronic hemodialysis. A correlation was found between age and plasma TnT values in the study by Deléaval.

et al in 2005 carried out at the hemodialysis center of the cantonal hospital of Friborg(Switzerland).

Regarding sex, it appears that men are probably more tend to have elevations of TnT than women. For glycemic status, hyperglycemic patients in the study series had mild elevations of troponin T than euglycaemia (49% in group II vs. 41% in group I). This result is consistent with those of a prospective pilot study observation conducted at an American veterans hospital by Roppolo et al. [11].

The study of ECG data shows that in group I (TnT negative) 85.3% have a normal ECG. In group II, 88.5% of cardiac involvement (anomaly ECG) for 15.8% of group I. Mallamaci et al. demonstrated in 2002that the concentration of troponin T in these patients may be significantly correlated with left ventricular mass [12].

Elevation of troponins has prognostic significance well established in ACS, but also in patients stable without suspicion of ACS. Even when the yare asymptomatic, patients on dialysis with elevation troponins have a 2-4 times higher risk of MACE (Major Adverse Cardiac Event) or death from all causes.

For these patients, troponins are an accurate and sensitive marker for predicting the occurrence of mortality cardiovascular. This association has also been studied in asymptomatic ambulatory patients with a stage 3 to 5 CKD. For them, the relative risk of mortality overall is 3.4 (95% CI: 1.111). In various studies, the rise in troponin has been correlated with clinical parameters such as degree of ventricular hypertrophy, ventricular ejection fraction, albumin/creatinine ratio, and progression of CRF to end-stage renal disease on dialysis.

Standardization of troponin measurement in CRI patients for prognostic purposes therefore seems attractive for clinical practice.

In the study by Sommerer et al. asymptomatic patients on chronic dialysis have a high risk of mortality when they accumulate TnT levels greater than0.026 ng/ml [13,14,15].

CONCLUSION:

The place of Troponin T as early indicators of cardiac pathology is well established. However, the rates of these two biomarkers can be found to be significantly elevated in chronic renal failure (CKD) without any obvious symptoms.

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The optimal practical use of these two parameters then requires taking into consideration of these findings, especially since the disease cardiovascular disease and its complications are the main cause of death and disability within the chronic hemodialysis population, hence the particular importance of early detection of cardiac involvement in these patients with a view to charge on time, thus avoiding complications with serious consequences on the patient and the state economy.

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