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The Importance of Creatine Phosphokinase (CPK) and Lactate Dehydrogenase (LDH) in the Early Diagnosis of Testicular Torsion*

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Abstract: We aimed to reveal the value of serum CPK and LDH levels in he early diagnosis of testicular tortion in this study. 15 adult male New Zealand rabbits were divided into 2 groups. The first group included 7 animals that experienced sham operation and approved as control animals. In the second group (n=8), the left testes were just twisted 720 degrees and fixed by a transmesorchial suture like Ryan described. Blood samples were obtained by venapuncture at 0, 4, 8, 24 hours and 4 weeks in each group; creatine phosphokinase (CPK) and lactate dehydrogenase (LDH) were determined. There was slight increase in LDH level in the second group but not statistically significant ($p>0.05$). On the other hand, significant increase in CPK levels ($p>0.05$) in 4 hours after torsion were seen (mean 6297±2012 compared to the level in the first sample, 2768±982). CPK tended to decrease after 8 hours (mean 4459±1867). No significant alterations were noted in both enzyme levels in those having sham operation ($p>0.05$). Thus, determination of serum CPK may be an auxiliary alternative in the diagnosis of testicular torsion.

Key Words: Testicular torsion, creatine phosphokinase, lactate dehydrogenase.

Introduction

Testicular torsion is one of the problems requiring urgent intervention because it causes infertility. Early diagnosis of testicular torsion is an important clinical problem of urology. Clinical examination is still important in the differential diagnosis. There are several techniques to establish this condition in the early phase (1-4). However, in recent years biochemical tests have got importance in the diagnosis of this disease due to their usefulness and not requiring more equipment.

This study was carried out to investigate the effect of testis torsion on serum CPK and LDH levels. For this purpose, we measured the levels of CPK and LDH during variouus stages after testicular torsion which we performed experimentally in rabbits, and investigated that if their levels would be helpful in the diagnosis of the disease.

Material and Methods

18 adult male New Zealand rabbits, of which 3 died during the study, were divided into 2 grups. The first group (n=7) experienced sham operation. In the second group (n=8) which served as torsion group, the left testes were just twisted 720 degrees and fixed by a transmesorchial sture like Ryan (5) described. Blood samples were obtained from venapuncture at 0, 4, 8, 24 hours and 4 weeks in each group; creatine phosphokinase (CPK) and lactate dehydrogenase (LDH) were determined by the enzymatic ultraviolet method in Technicon RA-XT outoanalyzer (Biotrol commercial kits, Paris). To check the distribution normality, goodness of fit test (Shapiro-Wilks) was done ($p>0.05$). Then paired-t test was used for statistical analyses. Each of testes were removed after 4 weeks to evaluate histopathologically in both groups.

The sensitivity, specificity, and predictive values for CPK levels at the 4th hour were estimated as described by Altman and Bland (6,7).

Results

No significant alterations were noted in both enzyme levels in those having sham operation ($p>0.05$), whereas CPK elevated significantly after 4 hours in the torsion group ($p>0.05$). On the other hand, it be-

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Group 1(n=7)	0	4 hours	8 hours	24 hours	4 weeks
LDH	281±125	273±187	309±161	274±124	290±97
CPK	2479±997	2668±998	2765±1278	2412±935	2352±1137

(Mean±SD)

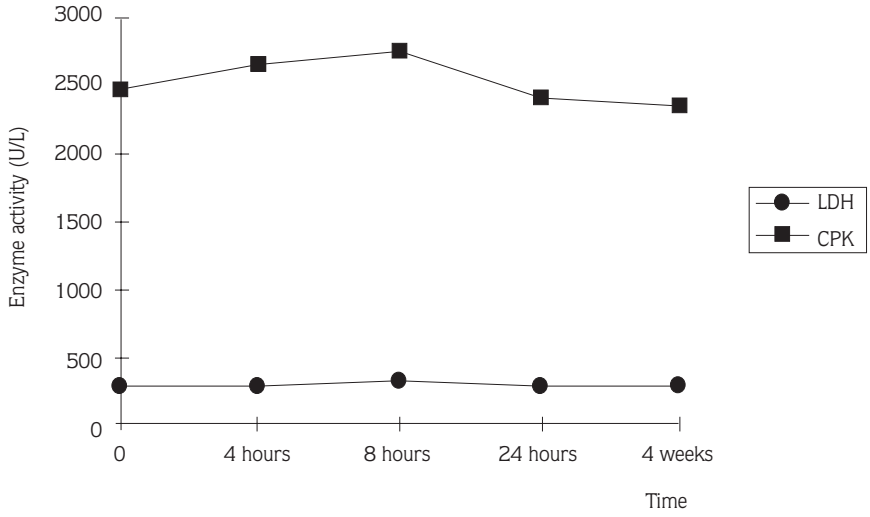

Figure 1. LDH and CPK activities in the controll group.

gan to decrease after 8 hours. LDH seemed to elevate early after torsion, but not found statistically significant (p>0.05). LDH and CPK levels, in both control and study groups, are listed in figure 1 and 2.

The histologic examination of these testes after sham operation revealed no abnormality. Testicular atrophy was found pathologically after 4 weeks of testicular torsion in left testes. There were some fibrotic alterations in seminifer tubules in controlateral testes of he second group.

Cut off point for CPK levels at the 4th hour was estimated as 3500 U/L. Thus, the sensitivity, specificity, positive predictive value and negative predictive value for CPK levels at the 4th hour were 75 %, 86 %, 75 % and 86 %, respectively.

Discussion

Testicular torsion is a serious emergency due to its deleterious effect on male fertility and which may end with loss of testis. Thus, the early diagnosis of the case will help to prevent these unpleasant results.

Various techniques are carried out in the diagnosis of testicular torsion. These are doppler stethoscope and radioisotope scanning to measure the testicular blood flow (3,4), scrotal ultrasonography (2) and magnetic resonance imaging (8). These examinations require equipment and qualified examiners which are not available in every health institutions. A rapidly performed test, available at all levels of medical care, and sensitive enough to reflect testicular ischemia at early phase would be of great help. Recentlyy, biochemical alterations are of interest in the diagnosis of this pathology. Since, ischemia of the testis and the cord structures are the main resultant pathologies which cause elevation of certain enzymes such as LDH and CPK. Freedman et al (9) observed in their experiment with dogs that serum CPK activity increased in he early phase of testicular torsion. Erol et al (10), proposed the determination of CPK activity as an auxiliary alternative in the diagnosis of these cases. Like the other studies, in our study CPK activity increased significantly 4 hours after the testes of the rabbits were twisted. We thought that it was important clinically because the determination of CPK from blood serum takes only about 5 minutes. Thus it could guide

Group 2(n=8)	0	4 hours	8 hours	24 hours	4 weeks
LDH	279±116	351±125	331±141	245±112	219±94
CPK	2768±982	6297±2012*	4459±1867	2784±1116	1976±1105

*p<0.05, mean±SD

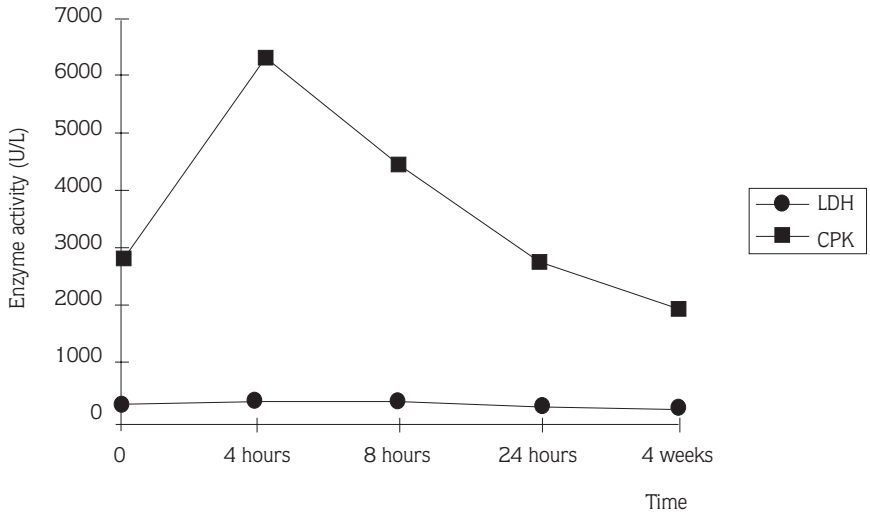

Figure 2. LDH and CPK activities in testicular torsion group.

the clinician to decide the management in the management in the early phase of testicular torsion.

The serum level of CPK rises following injury to various tissues, especially to heart or skeletal muscle. This is related to the enzyme release from the destructed muscle cells (11). Ischemia of the cremaster muscle occurs after testicular torsion. The ischemia in torsion should involve the cremasteric muscle fiber which results in the increase of CPK activity. Thus determination of this enzyme would be of help in the diagnosis of torsion (9).

Altought LDH seemed to elevate in our study, it was not statistically significant. Ulman's findings are also similar to our results (12). The total serum LDH can be separated in to 5 fractions; their electrophoretic pattern is used to differentiate diseases of the various body systems (11). Thus, the slight increase in LDH activity might be due to one of its fration related to striated muscles. We believe that, electrophoretic determination of LDH would have helped to obtain more reliable results.

As a result of this study, determinations of serum CPK is helpful in the early diagnosis of testicular torsion.

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