

Serum Creatine Kinase: A Marker for Diagnosis of Tubal Ectopic Pregnancy

Sharma N.R., Jina R., Srivastava R., Misra R.K., Gupta A.

Department of Obstetrics & Gynaecology and Pathology, B.R.D. Medical College, Gorakhpur

Summary

Serum creatine kinase (an intracellular metabolic enzyme whose greatest concentrations are found in skeletal muscle, myocardium, smooth muscle) has been studied in 120 patients. These 120 patients were divided into three groups. Forty were of normal intrauterine pregnancy less than 8 week duration, 40 were of missed abortion under 8 weeks and rest 40 were of tubal ectopic pregnancy. Estimation of creatine kinase in the above patients was done by ultraviolet kinetic method using autozyme CK, NAC kit. The mean level of the enzyme in normal intrauterine pregnancy was 106 ± 28.93 IU/L, in missed abortion group 110.25 ± 30.35 IU/L and in ruptured tubal pregnancies 172.56 ± 38.44 IU/L. It was concluded that 67.5% patients with ruptured tubal pregnancies had raised serum creatine kinase levels and this level was significantly higher than patients in normal and abnormal intrauterine pregnancy group. Thus serum creatine kinase level can be one of the markers in the diagnosis of ectopic pregnancy.

Introduction

Ectopic pregnancy remains a clinical challenge in spite of improvement in diagnostic tests and procedures. A definite diagnosis cannot be made in substantial number of patients after initial investigations.

Recently creatine kinase has been suggested a novel biochemical test for the diagnosis of ectopic pregnancy. It is an intracellular metabolic enzyme which catalyses adenosine triphosphate (ATP) production which is important for the contractile and transport systems. The greatest concentration of creatine kinase are found in skeletal muscle, myocardium, smooth muscle and brain. Increased serum creatine kinase activity nearly always reflects injury to the above tissues.

The fallopian tube lacks a submucosal layer and the ectopic trophoblast quickly penetrates and damages the smooth muscle layer. The enzyme creatine kinase is

released from the damaged muscle cells into the circulation where it can be measured. The level of the enzyme increases 4-6 hours following injuries with a peak level after 24 hours and a return to normal activity by third day. Thus blood level of creatine kinase can be of predictive value in the diagnosis of early ectopic pregnancy.

Material and Methods

This study was conducted in the department of obstetrics and Gynaecology, B.R.D. Medical College, Gorakhpur between the year 1997 and 1998.

One hundred twenty patients (Table I) were selected for study. They were divided into following three groups: -

Group-A: Women with normal pregnancy under 8 weeks

Group-B: Women with missed abortion under 8 weeks.

Group-C: Tubal pregnancy

Table-I
Table Showing the Distribution of Cases

S.No.	Total No. of Cases	Normal intrauterine pregnancies under 8 weeks (Group A)	Abnormal intrauterine pregnancies (Missed abortion) under 8 weeks (Group B)	Ruptured tubal pregnancy (Group B)
1.	120	40	40	40

Table-II
Table Showing Distribution of Serum Creative Kinase Levels Among the Control Group

S.No.	Serum creatine kinase level in IU/l.	Group A		Group B	
		Normal pregnancies under 8 weeks No. of cases	Percentage	Missed abortions under 8 weeks No. of cases	Percentage
1.	0-30	Nil	-	Nil	-
2.	30-165	40	100.00	34	85.00
3.	166-200	-	-	06	15.00
4.	201-250	-	-	-	-
Total		40	100.00	40	100.00
Mean	Group A	106		Group B	110.25
S.D.		28.93			30.35

z test between normal pregnancy under 8 weeks
Vs Missed abortion under 8 weeks
= 0.641; p 0.05, Insignificant

Table-III
Table Showing the Distribution of Serum Creatine Kinase Levels Among the Patients of Study Group i.e. Ruptured Tubal Pregnancies

S.No.	Levels of serum creatine kinase In IU/L	Ruptured tubal pregnancies Group C (No. of cases)	Percentage
1.	80-165	13	32.5
2.	166-200	18	45.0
3.	201-250	09	22.5
Total		40	100.0
Mean		172.56	
S.D.		38.44	

Serum creatine kinase was studied in the above patients by ultraviolet kinetic method using autozyme CK-NAC kit supplied by Accurex Biomedical Pvt. Ltd. This kit measures creatine kinase released by the injury of smooth muscle only (does not indicate injury of myocardium or skeletal muscle).

Discussion and Conclusion

The normal value of creatine kinase in females is less than 165 IU/L. All the patients in the group of normal

intrauterine pregnancies had normal levels, i.e. 30-165 IU/L (Table-II), whereas in the group of missed abortion 85% patients had normal serum creatine kinase levels (30-165 IU/L) and 15% patients had elevated levels in the range of 166-200 IU/L. This higher level in 15% might be because of much invasion of myometrium. The mean levels of serum creatine kinase in women with ruptured tubal pregnancy (Table-IV) was 172.56 ± 38.44 IU/l, significantly higher than mean levels in missed abortion group (110.25 ± 30.35 IU/L) ($p < 0.001$) or normal intrauterine pregnancy under 8 weeks (106 ± 28.93 IU/L)

Table-IV
Table Showing the Distribution of Mean Creatine Kinase Levels Among the Cases and Controls

S.No.	Groups	Mean serum creatine Kinase levels	
1.	Group A Normal intrauterine pregnancy under 8 weeks	106.00 ± 28.93	
2.	Group B Missed abortion under 8 weeks	110.25 ± 30.35	
3.	Group C Ruptured tubal pregnancies	172.56 ± 38.44	
4.	Comparison between Group C and A	p 0.001	MHS
5.	Comparison between Group C and B	p 0.001	MHS
	Z test between A Vs C = 8.750 P < 0.001		MHS
	Z test between A Vs B = 0.641 P > 0.05		NS
	Z test between B Vs C = 0.046 P < 0.001		MHS

(p<0.001).

The lowest value of serum creatine kinase in the control group was 30 IU/L (Table-II) whereas the lowest value of serum creatine kinase observed in the ruptured tubal pregnancy group was 80 IU/L (Table-III).

Similar results were observed by Lavie et al (1993). Our results were also supported by Duncan et al (1995). Our work was not supported by Korhonen et al (1996). The number of patients were less in Korhonen series so real comparison could not be made. Our work was also not supported by Vandermolan and Borzelleca (1996).

According to Quasim et al (1996) the values of serum creatine kinase were same in normal, abnormal intrauterine and in ectopic pregnancy. The reason might be due to minimal damage to smooth muscle as the cases were diagnosed very early by serial beta HCG and vaginal sonography. The penetration in the muscle layer by the trophoblast was very little so the level of enzyme was normal in their ectopic pregnancy cases.

In our study we found the levels of serum creatine kinase significantly higher in the ruptured tubal pregnancy group because most of the patients presented with acute symptoms suspicious of early tubal rupture causing significant muscular damage and consequently higher levels of the enzyme. 35.5% of the patients of ruptured tubal pregnancy had serum creatine kinase level between 80-165 IU/L (Table-III). This was almost normal because these patients presented with history of long

duration. They were very old ruptures so in these cases level of the enzyme might have dropped down at the time of estimation. 45% of ectopic cases the level was between 166-200 and in rest 22.5% it was 201-250 IU/L.

We had no case of unruptured tubal pregnancy because most of our cases were poor and uneducated coming from rural areas. As opposed to the other workers, where most of the cases were of early unruptured tubal ectopic pregnancy, which was diagnosed by HCG or sonography. Their normal values might be because of least tubal damage leading to no rise or a very little rise of serum creatine kinase. In our cases the level of the enzyme was raised in early rupture cases.

So it is concluded from our study that raised serum creatine kinase level indicates early rupture of tubal ectopic pregnancy.

References

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