

The ROC curves demonstrated a significant discriminatory ability of increased CK levels in ruptured ectopic pregnancy from control group. The AUC for CK in ruptured was 0.988 (95%CI: 0.964–1.013). A significant difference from the control was found in ruptured EP ($P < 0.001$).

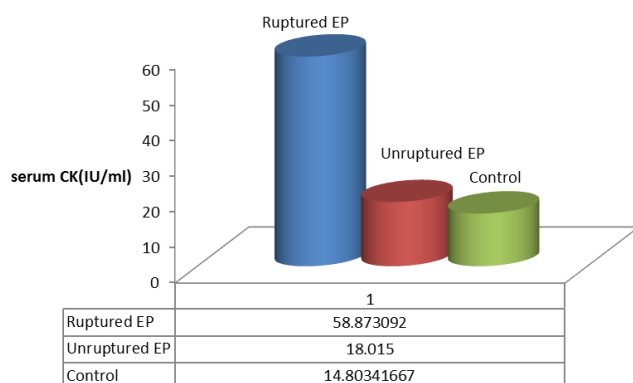


Fig. 5. Levels of serum CK in ruptured, unruptured EPs and control groups.

When using CK ruptured concentration of 23.3 IU/ml as a cut-off value for the diagnosis of ruptured ectopic pregnancy from unruptured groups, sensitivity was 96%, specificity 100%, the positive predictive value was 100%, the negative predictive value 96.9% and efficiency 97.9%.

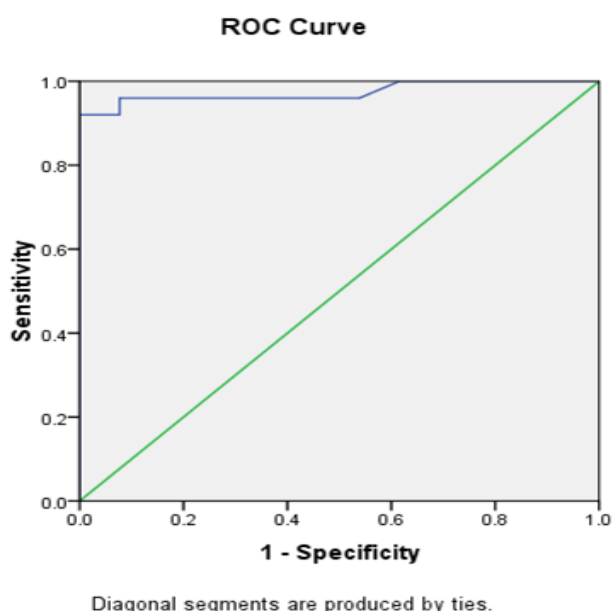


Fig. 6. Receiver Operator Characteristic (ROC) curves of increased CK in ruptured ectopic pregnancy levels from unruptured groups.

Discussion

Creatine kinase (CK) is an enzyme that is released when muscle becomes damaged⁽¹⁸⁾. The first study of CK as a marker of Fallopian tube damage produced some encouraging results⁽⁹⁾.

In the current research, CK levels were significantly increased in women with tubal EP compared with both women with IU abortion ($P < 0.00$) and those with normal gestation ($P < 0.00$).

A rise in serum CK level is natural in tubal gestation, because the zygote penetrates the tubal epithelium and lies adjacent to the muscle layer which lacks a sub mucosa^(8,10). Due to invasion of the muscle layer by trophoblasts, the maternal blood vessels are eroded and blood leaks through the growing trophoblasts and damaged muscle layer giving a rise in muscle cell product like CK^(8,10). The pathology in missed abortions is different and there is no rise in serum creatine kinase⁽¹⁰⁾, as is also evident from our results.

The present results are in agreement with Lavie *et al*⁽⁹⁾, who studied the role of maternal serum CK levels as a predictor of tubal pregnancy. They found that serum CK levels were significantly higher in the tubal pregnancy group than in spontaneous abortion and normal pregnancy. Similar results were obtained by Saha *et al*⁽¹¹⁾ in their comparative study of 20 patients evaluated and endorsed the positive role of serum CK as a possible marker of tubal pregnancy. Develioglu and coworkers⁽¹⁹⁾ conducted a comparative study on 32 cases and their results revealed that serum CK levels can be taken as an adjuvant tool in ruling out ectopic pregnancy, particularly if it was ruptured ectopic pregnancy. Yet another comparative study by Singh *et al*⁽⁸⁾ on 15 patients revealed that CK levels were higher in tubal pregnancy than normal intra-uterine pregnancy. Several authors have, however, found conflicting results from Qasim *et al* and Vitoratos^(14,17).

Also in this study serum CK concentrations were significantly higher in the patients with ruptured tubal ectopic pregnancy compared with