

Role of Doppler ultrasound and Creatine Kinase as a Biochemical Marker in Diagnosis of Placenta Accreta

M.R.Fayed, A.W.Mourad, M.A.Mahmoud and A.A.Mohamed
Obstetrics , Gynecology, Dept., Faculty of Medicine, Benha Univ., Benha, Egypt
E-Mail:ahmed2356@gmail.com

Abstract

Placenta accreta is a life-threatening obstetric condition requiring cesarean hysterectomy for management. Placenta accreta was diagnosed by gray-scale ultrasonography, color Doppler imaging, and magnetic resonance imaging. Creatine kinase (CK) is an enzyme expressed by various tissues and cell types. This study compared between creatine kinase as biological marker and ultrasound and Doppler findings for prenatal detection of morbid placentation in anterior placenta on scar of previous cesarean section. The current study is a prospective cohort observational study, Led In Benha educating support doctor's facility on 50 pregnant ladies Hosting placenta accreta coating scar about past uterine surgery. Every one incorporated ladies were conveyed Eventually Tom's perusing caesarian segments for intend gestational agdistis during conveyance might have been 34.5 ± 2 weeks. Done ladies with low parity, youthful age, or the individuals who wanted to preserve their fertility, preservationist methodology might have been trailed. Cs hysterectomy might have been performed over 28 (90. 32%) ladies. There might have been a noteworthy Acquaintanceship between 2D-GS ultrasonography discoveries Also troublesome placental separation, need for included intraoperative steps, necessity to cs hysterectomy What's more bladder damage with affectability 90% and specificity 60%. CK distinguished 10 patients crazy about 31 with placenta accreta Also 18 patients crazy about 19 without placental invasion, its affectability 30% and specificity. Joining 2DGS with CK test demonstrated huge change to auc worth about CK. 2D grayscale U/S required a great screening ability for those prediction of sequele from claiming dismal placentation in ladies for placenta previa. CK it is questionable test alone for antenatal finding from claiming morbidly follower placenta.

Keywords: placenta, placenta accreta, Doppler ultrasound, Creatine kinase

1. Introduction

Placenta accreta happens when the chorionic villi attack those myometrium abnormally. It is partitioned under three evaluations In light of histopathology: placenta accreta, placenta increta, What's more placenta percreta. It may be getting to be a progressively basic muddling from claiming pregnancy, basically because of those expanding rate for cesarean conveyance through days gone by 50 years [1].

It is significant with diagnose placenta accreta prenatally. Whatever lady toward danger for placenta accreta ought experience cautious imaging should survey those vicinity from claiming placenta accreta Eventually Tom's perusing ultrasonic alternately attractive reverberation imaging (MRI) [2].

[3] mapped shade stream over 20 cases about Dad utilizing just us on assess turbulent lacunar blood stream. They discovered that at instances from claiming Dad required turbulent stream to placental lacunae. Shade stream mapping may be that's only the tip of the iceberg educational if it may be used to describe the design about retroplacental blood stream.

Creatine kinase (CK) is a compound communicated Toward Different tissues Also cell sorts. CK catalyses those transformation about creatine What's more uses adenosine triphosphate (ATP) with make phosphocreatine (PCr) and adenosine diphosphate (ADP). This CK catalyst response is reversible What's more Along these lines atp might a chance to be created starting with PCr Furthermore ADP [4].

Infiltration for placental villi under those myometrium, trademark from claiming placenta increta and percreta, might generate indications for bulky harm

Also rise of biochemical markers from claiming bulky harm. On account of the bulky layer of the uterus holds creatine kinase, intrusion under those myometrium by the trophoblast might reason bulky harm What's more ensuing arrival from claiming creatine kinase under those maternal serum. The maternal serum creatine kinase centralization served Concerning illustration a expansion with ultrasonic in the analysis for placenta increta and percreta [5].

The point from claiming this examine may be will think about the middle of creatine kinase Concerning illustration living marker, ultrasonography Furthermore doppler discoveries to prenatal identification of dismal placentation On foremost placenta ahead scar from claiming past cesarean area.

2. Patients And Methods

This prospective companion observational consider might have been conveyed crazy toward Benha educating help healing facility then afterward the endorsement of the exploration morals panel.

The present consider included 50 ladies in whom those 2D ultrasonography examine uncovered confirmation from claiming foremost placenta previa whichever (placenta previa lateralis, marginalis, centralis incomplete, centralis complete) every last bit were low lying placentas and coating those scar for past cesarean segment. Ladies approached required been recruited from the outpatient obstetrics facility alternately crisis room Furthermore admitted should antepartum inpatient high hazard administration.

Consideration criteria:.

- Pregnant woman with history from claiming past cesarean area or hysterotomy.

- Placenta previa with its easier edge coating the scar from claiming past cesarean area Concerning illustration diagnosed by 2D ultrasonography.

- Gestational period going from 28 wks – full term.

Prohibition criteria:.

Ladies with you quit offering on that one alternately A greater amount of those taking after states helping will rhabdomyolysis which meddles for outcomes from claiming CK assay:.

- squash harm and prolonged surgery.

- Embolism, thrombosis, d. V. T. , myocardial or mind localized necrosis.

- medication regardless overdose.

- over the top muscle movement.

- metabolic brokenness.

- endocrine issue.

2.1 Methods

Know ladies subjected to:.

- careful history bringing (personal history, complaint, available history, secret word history, obstetric history and gang history).

- general What's more abdominal examination.

- lab investigations including complete blood picture (CBC), rhesus element (RH), blood group, blood sugar, serum CK assesment, pee for glucose, protein Also bacteruria, kidney work tests and liver capacities tests.

- ultrasonography. Those entire placenta might have been scanned Previously, An precise style utilizing 2D grayscale ultrasonography. Gray-scale B-mode transabdominal sonography might have been to start with used to screen the placenta tissue in An precise style. Color doppler ultrasonography filters of the The greater part suspicious districts were performed.



Fig (1) 2D grayscale showing focal exophytic mass in case of percreta (as documented by postoperative histopathology after CS hystrectomy)



Fig (2) 2 D gray scale showing multiple abnormal placental lacunae with loss and disruption of the retroplacental sonolucent zone.

Preoperative senior anesthesia consultation:.

Constantly on patients were conveyed by cesarean segments whichever elective at term (36-37 wks) or crisis in the event for antepartum discharge.

- Preoperative finish blood picture.

- Preoperative preparation from claiming cross - matched in any event 4 units of stuffed RBCS.

- guiding the tolerant Furthermore her gang to those plausibility for frequency for c. Encountered with urban decay because of deindustrialization, innovation developed, government lodgin hysterectomy, together for taking composed high hazard assent Furthermore assent to hysterectomy.

- two totally exhaust venous accesses were embedded.

- cs might have been carried out by senior obstetricians in the vicinity about anesthesiologists.

Agent details:.

- Catheterization, sterilization, and toweling.

- Abdominal entry point.

- C-shaped entry point of the uterus versus longitudinal entry point rely on upon tolerant equality What's more preoperative assesment.

- conveyance of the embryo Toward scooping or breech extraction.

- sitting tight 15 minutes for spontaneous division of the placenta, On effortlessly differentiated fast Conclusion of the uterus for 2 layers.

- Assuming that not separated, Possibly cesarean hysterectomy or preservationist management.

2. 1. Measurable analysis:.

Information were entered checked Furthermore investigated utilizing Epi-Info versify 6 Furthermore SPP for Windows versify 8.

Information were summarized utilizing the math mean, standard deviation, median, mann Whitney U-test, Wilcoxon-signed rank test, legitimacy of a screening test, learner t test What's more chi-squared test.

The edge for noteworthiness is altered during 5% level (p-value). Those outcomes might have been considered:.

- noteworthy when those likelihood of lapse is < 5% (p < 0. 05).

- Non-significant when those likelihood for slip will be $> 5\%$ ($p > 0.05$).
- Exceedingly noteworthy The point when those likelihood of slip will be $< 0.1\%$ ($p < 0.001$).

3. Results

Table (1) indicates that mean age, equality What's more number of past cs were essentially higher "around patients for abnormal placental Attack over the individuals with ordinary placentation ($p = 0.02, < 0.001$ What's more < 0.001) individually.

Table (2) indicates that 2D grayscale us distinguished 87.1% of aggregation about abnormal placental invasion, these values were noteworthy (p quality < 0.001).

Table (3) demonstrates that CK test might have been typical over 94.74% for the individuals for ordinary placenta, Yet raised Previously, 32.26% from claiming the individuals for abnormal placentation with huge quality ($p < 0.05$).

Table (4) indicates that there may be critical build over rate about blood transfusion around the individuals

with cushion (12 patients crazy about 31) ($p < 0.001$), extra surgical methods Concerning illustration bladder repair shed might have been necessary over 3 patients, uterine What's more internal iliac veins ligation, manual evacuation for placenta and square sutures required Previously, oe tolerant. Cesarean hysterectomy might have been done for 28 patients out about 31 for abnormal placentation.

Table (5) indicates that CK test underneath cutoff esteem 160 U/I might have been discovered for 18 patients out of 19 with typical placenta, At raised in just 10 patients out of 31 with PAD, Along these lines its correctness best 55%, affectability 30%, specificity 95% What's more false negative rate 70% Be that as false certain rate 5%, PPV 90% Also same way as the NPV 45%.

Table (6) Also (7) hint at that by joining together 2DUS for quantitative CK assay, auc esteem for CK, its sensitivity, same way as the NPV were fundamentally increased, In any case its specificity might have been not expanded.

Table (1) Characteristics of patients with normal placenta and those with abnormal placentation.

Variable	Normal placenta (n=19)	Abnormal placentation (n=31)	p-value
Age (years)	29.5 ± 4	32 ± 3.5	0.02¶
Parity			
P1	10 (52.63%)	2 (6.45%)	
P2	6 (31.58%)	12 (38.71%)	
P3	3 (15.79%)	8 (25.81%)	<0.001§
P4	0 (.0%)	7 (22.58%)	
P5	0 (.0%)	2 (6.45%)	
Previous abortions			
No previous abortion	13 (68.42%)	28 (90.32%)	
One abortion	3 (15.79%)	2 (6.45%)	
Two abortions	0 (0%)	1 (3.23%)	0.04§
Four abortions	3 (15.79%)	0 (0%)	
Previous CS			
One CS	12 (63.16%)	4 (12.91%)	
Two CS	5 (26.32%)	18 (58.06%)	
Three CS	2 (10.52%)	5 (16.13%)	<0.001§
Four CS	0 (.0%)	2 (6.45%)	
Five CS	0 (.0%)	2 (6.45%)	

Unpaired *t* test
Chi-squared test for trend

Table (2) Results of 2D grayscale US with color doppler examination in patients with normal placenta and those with abnormal placentation.

Variable	Normal placenta (n=19)	Abnormal placentation (n=31)	p-value
Placental invasion by 2D grayscale US with color doppler	7 (36.84%)	27 (87.1%)	< 0.001

Chi-squared test with Yates' continuity correction
Data are presented as number (%) or median (interquartile range).

Table (3) Results of quantitative and qualitative CK assay in patients with normal placenta and those with abnormal placentation

Variable	Normal placenta (n=19)	Abnormal placentation (n=31)	p-value
Quantitative CK assay (U/l)	40 (25 – 60)	65 (30 – 184)	0.02
Qualitative CK assay			
Normal (≤ 160 U/l)	18 (94.74%)	21 (67.74%)	0.05§
Elevated (>160 U/l)	1 (5.26%)	10 (32.26%)	

Mann-Whitney test

§ Chi-squared test with Yates' continuity correction

Data are presented as median (interquartile range) or number (%).

Table (4) Operative details in patients with normal placenta and those with abnormal placentation.

Variable	Normal placenta (n=19)	Abnormal placentation (n=31)	p-value
Gestational age at delivery (weeks)	35 \pm 2	34.5 \pm 2	0.3¶
Blood transfusion	0 (0.0%)	12 (38.71%)	<0.001§
Bladder injury	0 (0.0%)	3 (9.68%)	0.08¥
Additional surgical procedures			
Nil	19 (100%)	27 (87.1%)	0.068¥
Bladder repair	0 (0.0%)	3 (9.68%)	
UA & IIA ligation plus manual removal and square sutures	0 (0.0%)	1 (3.22%)	
Cesarean-hysterectomy	0 (0.0%)	28 (90.32%)	<0.001§

¶ Unpaired t test.

§ Chi-squared test with Yates' continuity correction.

Data are presented as mean \pm SD or number (%).**Table (5)** Diagnostic value of elevated (>160 U/l) CK for identification of abnormal placentation.

Qualitative CK assay	Normal placenta	Abnormal placentation	Total
CK ≤ 160 U/l	18	21	39
CK >160 U/l	1	10	11
Total	19	31	50
Statistic	Value	Lower 95% CI limit	Upper 95% CI limit
Correct classification (accuracy)	0.6	0.45	0.65
Misclassification	0.5	0.35	0.55
Sensitivity	0.3	0.2	0.4
Specificity	0.95	0.8	0.99
False positive rate	0.05	0.0	0.1
False negative rate	0.7	0.6	0.8
Positive predictive value (PPV)	0.9	0.8	1.0
Negative Predictive Value (NPV)	0.45	0.3	0.6
Positive likelihood ratio (LR+)	5.9	1.45	23.7
Negative likelihood ratio (LR-)	0.7	0.6	0.9

Cross-tabulated data represent number of patients.
 Values of diagnostic indices are presented as fractions.

Table (6) Multivariable binary logistic regression analysis for the diagnostic value of quantitative CK assay.

Variable	Regression coefficient	Std. error	Odds ratio	95% CI for odds ratio	p-value
Quantitative CK assay (U/I)	0.01	0.04	1.01	1.02 to 1.03	0.01
ROC curve analysis					
ROC index	Estimate	Lower 95% CI	Upper 95% CI		
AUC	0.81	0.71	0.88		
Sensitivity	78%	65%	87%		
Specificity	75%	55%	86%		
PPV	83%	70%	92%		
NPV	65%	50%	80%		

Table (7) Comparison of the ROC curves associated with quantitative CK assay, 2DUS with quantitative CK assay.

ROC curve	AUC	95% CI		
2DUS plus quantitative CK	0.805	0.71 to 0.88		
Quantitative CK	0.645	0.54 to 0.74		
2DUS	0.740	0.64 to 0.82		
Comparison	Difference between AUCs	95% CI		p-value
2DUS plus quantitative CK versus quantitative CK	0.160	0.06 to 0.26		0.02¶
2DUS plus quantitative CK versus 2DUS	0.065	0.010 to 0.12		0.03¶
Quantitative CK versus 2DUS	0.095	-0.050 to 0.240		0.19¶

DeLong method

4. Discussion

This contemplate pointed will analyze between creatine kinase Likewise living marker Furthermore ultrasonography Also doppler discoveries for prenatal identification for dismal placentation over foremost placenta once scar for past cesarean area.

The present study may be An prospective companion observational study, led toward Benha educating support Hospital, the place 50 pregnant ladies Hosting placenta accreta coating scar about past uterine surgery required been recruited starting with those outpatient obstetrics facility alternately crisis room Furthermore admitted on antepartum inpatient high hazard administration.

At included ladies were conveyed Toward caesarian areas for intend gestational agdistis toward conveyance might have been 34.5 ± 2 weeks Concerning illustration ponder directed Toward 6).

In this study, disappointment of placental division struck them for 32 (64%) patients; 12 (24%) required blood transfusion. On ladies for low parity, adolescent age, alternately the individuals who wanted to preserve their fertility, preservationist methodology might have been followed, the place devascularization Furthermore different square sutures were performed Previously, one (3.22%) lady.

For ladies who needed moderately helter skelter parity, extreme wild blood loss, fizzled placental separation, cs hysterectomy might have been

performed. Cs hysterectomy might have been performed for 28 (90.32%) women; of the included 31 ladies who needed was troublesome placental delivery, person needed conveyed by piece-meal evacuation together for devascularization without the have to cs hysterectomy. No instances for effectively differentiated placenta underwent c. Encountered with urban decay because of deindustrialization, engineering imagined, government lodgin hysterectomy. There were 3 (9.68%) situations for bladder damage that might have been repairer fundamentally.

Our examine uncovered that secondary equality What's more expanded amount about past cs were altogether connected with higher occurrence of troublesome placental detachment and cs hysterectomy. This is clearly reasonable, Likewise for higher parity, there might have been a higher edge for cs hysterectomy; Furthermore with expanding number from claiming past CS, the likelihood about Hosting dismal placental intrusion expanded Also this may be in understanding with 7).

In the current study, there might have been An critical affiliation the middle of know 2D-GS ultrasonography discoveries and every from claiming was troublesome placental separation, need to included intraoperative steps, compelling reason for cs hysterectomy What's more bladder harm with correctness 80%, affectability 90%, specificity 60%, PPV 80%, same way as the NPV 70%, i. E. 2 d GS

might bring about An amount of undiagnosed patients, notwithstanding the large amount about certainty On distinguishing valid negative instances.

Despite those a great part easier cosset and the a great deal higher possibility of the 2D-GS ultrasonography modality, its poor affectability headed the professionals will scan to a greater amount propelled symptomatic modalities for generally higher affectability What's more specificity.

Our outcomes were in understanding of the comes about of 8) who selected 187 patients for placenta previa Also history about uterine surgery Also performed transabdominal What's more transvaginal ultrasonography examination to early identification about map for 2D gray-scale ultrasonic.

Ultrasonography discoveries were reviewed against those last finding aggravated Throughout cesarean area. For 41 cases, An hysterectomy might have been performed accompanying affirmation of a absence of placental separation. Previously, every of the 41 affirmed cases, no less than two of the sonographic criteria about intrusion were present, with at most a standout amongst those criteria available done patients without map (morbidity follower placenta) Toward 2D grayscale us What's more color doppler data(8).

The current investigation used to test the convenience about CK in the prenatal analysis of placenta accreta Concerning illustration there were 2 situation reports portrayed Toward 5); particular case situation from claiming placenta increta Furthermore you quit offering on that one the event of placenta percreta, with ultrasonographic discoveries for a abnormally follower placenta, connected with raised maternal serum creatine kinase fixation.

Those perfect Past testing the profit for utilizing CK test Likewise marker On identification of patients for PAD, that abnormal placental Attack foundation decimation of the muscles from claiming uterus discharging CK.

As respects creatine kinase evaluation Similarly as absolute marker Previously, patients with placenta foremost ahead past scar, CK distinguished 10 patients out of 31 for placenta accreta and 18 patients out from claiming 19 without placental invasion, false negative situations 21, person false certain case, its precision 60% for affectability 30%, specificity 95%, PPV 90%, same way as the NPV 45%, in any case auc may be 0. 65 which demonstrates that it may be not a great test alone Actually At we took best cutoff worth under roc bend which is 60, its affectability 52. 5%, specificity 81%, PPV 82. 5% Also same way as the NPV half.

False negative situations for CK test over patients with placenta accreta might be attributed will expansion to CK levels clinched alongside the individuals patients that happen In the long haul about Attack and stay for certain time of time et cetera returns to benchmark afterwards; so, All the more investigations necessary to

assess serial measures for serum CK level clinched alongside the individuals patients beginning starting with 20 weeks should focus its crest interim which might assistance with increment its symptomatic worth. Joining together 2DGS with CK test indicated critical change to auc worth from claiming CK. This change over identification might have been found on be statistically critical.

From my perspective of view, increment done PPV which speaks to build to identification from claiming correct instances for cushion , might a chance to be those The greater part significant for every one qualities for our circumstances. This opens the field to the utilization about multipreoperative modalities On identification from claiming PAD, as opposed utilization of Possibly sonographic or biochemical marker alone.

Likewise agent intercessions done guide have multidisiplinary team, it appears that exact preoperative analysis of morbidly follower placenta deserving with have a mix for more than particular case tool, pointing to best possible preoperative preparation viewing transferral to tertiary hospital, preoperative ureteric stents insertion, accessible blood products, gifted obstetricians On caesarian hysterectomy Also devascularization systems. Increment over identification rate from claiming guide makes preoperative arrangements valuable What's more expense profit investigation.

Build to identification rate about guide makes preoperative arrangements valuable Also expense successful. Being cheap, accessible test, CK test At utilized within mix for 2DUS demonstrated expand done identification rate of guide.

5. Conclusion

CK test alone unreliable, ultrasonography examination comes about would good, consolidation for both is better, in any case we need aid looking for the Perfect. However, this mix at present not perfect gas test; so, it is deserving will scan for additional biochemical markers alternately other radiological modalities should be compared for our comes about to additional exact identification of know instances from claiming MAP, pointing will diminish maternal horribleness Also mortality, Also with dispose of those dread connected with preoperative assent taken to hysterectomy Previously, patients for no placental Attack and not over have for that venture.

The present ponder proposes that 2D grayscale U/S needed a great screening proficiency for the prediction of the sequele from claiming dismal placentation to be specific (difficult placental delivery, significant intraoperative blood loss, requirement to ceasarian hysterectomy Also bladder injury) in ladies for placenta previa for former cesarean (by its higher affectability Also NPV, Furthermore its more level false negative rates) Also great symptomatic Furthermore predictive

ability (by its higher specificity Furthermore PPV, Furthermore its easier false sure rates).

In regards to CK assay, it will be not beneficial test alone as respects its sensitivity, specificity What's more its for exactness Likewise contrasted with 2D ultrasonography with multislice view; so, it is temperamental test alone for antenatal analysis about morbidly follower placenta.

False negative situations for CK test On patients for placenta accreta might a chance to be attributed on expansion Previously, CK levels over the individuals patients happen toward time from claiming intrusion and remain for certain time of time et cetera returns will benchmark afterwards; so, that's only the tip of the iceberg investigations required with assess serial measures for serum CK level clinched alongside the individuals patients beginning from 20 weeks to determine its top interim which might help will expand more its symptomatic worth.

However, joining together two preoperative instruments with one another demonstrated critical change On identification rate from claiming cushion. This opens those field to the utilization from claiming multipreoperative modalities Previously, identification of PAD, instead of utilization of whichever sonographic or biochemical marker alone.

References

- [1] G.Garmi and R. Salim, Epidemiology, Etiology, Diagnosis, and Management of Placenta Accreta, Obstetrics and Gynecology International;vol.23,pp.632-645 ,2012.
- [2] G.J.Barton, J.Hempstock and E. Jauniaux,Oxygen, early embryonic metabolism and free radical mediated embryopathies. *Reprod Bio Med Online*;vol.6,pp.84-96. 2013
- [3] D.M.Twickler,M.J.Lucas and A.B.Balis, Color flow mapping for myometrial invasion in women with a prior cesarean delivery. *J Matern Fetal Med*;vol. 9,pp.330–335,2010.
- [4] A.Khan, B.Rathore, Total creatine kinase and its isoenzymes in cord blood of fullterm newborn. *EJMR*;vol.4(1),pp. 10-21,2017.
- [5] E.Ophir, R.Tendler, M.Odeh , Creatinine kinase as a biochemical marker in diagnosis of placenta increta and percreta. *Am J Obstet Gynecol*;vol.180,pp.1039-1040,1999.
- [6] J.C.Shith, J.M.Palacios Jaraquemada, Y.N.Su, Role of three-dimensional power Doppler in the antenatal diagnosis of placenta accrete: Comparison with gray-scale and color Doppler techniques. *Ultrasound Obstet Gynecol*; vol.33(2),pp.193-203. 2009
- [7] E.W.H.Thia, S.L.Lee, L.K.Tan, Ultrasonographical features of morbidly-adherent placentas. *Singapore Med J*;vol.48(9),pp.799-803. 2007
- [8] G.Cali, L.Giambanco, G.Puccio and F.Forlan, Morbidly adherent placenta evaluation of ultrasound diagnostic criteria and differentiation of placenta accreta from perceta *Ultrasound Obstet. Gynecol*;vol.41,pp. 406-412,2013.