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Correlation of Post-Evacuation Serum β-hCG Levels with Persistent Gestational Trophoblastic Neoplasia: A Tertiary Care Experience

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Abstract **Original Research Article**

Background: Gestational trophoblastic disease (GTD) includes various abnormal cell growths from the placental trophoblast, such as hydatidiform mole, invasive mole, choriocarcinoma, and placental site trophoblastic tumor (PSTT). This study aimed to determine if post-evacuation serum hCG levels and their ratio during the first two weeks could predict persistent gestational trophoblastic neoplasia (GTN) in complete molar pregnancies. ***Aim of the study:*** The aim of the study was to evaluate the relationship between post-evacuation serum β-hCG levels and the occurrence of persistent gestational trophoblastic neoplasia in patients at a tertiary care center. ***Methods:*** This cross-sectional study was conducted at the Outpatient Department of Gynecological Oncology, BSMMU, Dhaka, in 2021, involving 50 patients with histopathologically confirmed molar pregnancy. Post-evacuation β-hCG levels were monitored to assess the risk of persistent gestational trophoblastic neoplasia (PGTN). Data were analyzed using SPSS version 20 with t-tests, chi-square tests, ROC curves, and logistic regression, setting $p<0.05$ as significant. ***Results:*** GTN-positive patients were younger, had lower incomes, and were underweight. They showed a higher prevalence of grape-like vesicle expulsion, thyrotoxic symptoms, prior molar pregnancies, and family history of molar pregnancy. β-hCG levels >100,000 mIU/mL were found in all GTN-positive cases. Log-transformed β-hCG levels from weeks 5 to 8 were higher in GTN-positive cases, with week 8 β-hCG providing 97.7% sensitivity, 100% specificity, and an AUC of 0.997 for GTN prediction. ***Conclusion:*** Elevated post-evacuation β-hCG levels and specific clinical factors are strong predictors of persistent gestational trophoblastic neoplasia in hydatidiform mole, highlighting the importance of early detection.

Keywords: Correlation, Post-Evacuation, Serum β-hCG Levels, Persistent Gestational Trophoblastic Neoplasia, Tertiary Care.

INTRODUCTION

Gestational trophoblastic disease (GTD) is a term used to describe a range of abnormal cell growths that arise from the placental villous trophoblast. It includes four main clinicopathologic forms: hydatidiform mole (both complete and partial), invasive mole, choriocarcinoma, and placental site trophoblastic tumor (PSTT). The term "gestational trophoblastic neoplasia" (GTN) encompasses three conditions—invasive mole, choriocarcinoma, and placental site trophoblastic tumor (PSTT)—which can progress, invade, metastasize, and become life-threatening if left untreated. Hydatidiform moles are often accompanied by serious bleeding and other medical complications prior to the development of early detection and effective uterine evacuation. Persistent gestational trophoblastic neoplasms are among the most treatable solid tumors, with cure rates of up to 90%, even in cases of widespread metastatic disease, when appropriate chemotherapy is administered [1].

The incidence of gestational trophoblastic disease (GTD) varies significantly across different regions, ranging from as low as 23 per 100,000

pregnancies in Paraguay to as high as 1,299 per 100,000 pregnancies in Indonesia [2]. In the United States, the incidence of molar pregnancy is 1 in 1,000 pregnancies, while in the United Kingdom, it is 1.5 in 1,000, and in Japan, it is 2 in 1,000 [3]. Incidence of molar pregnancy was 8.27 per thousand pregnancies in a study conducted at Faridpur Medical College Hospital, Bangladesh [4]. Other studies showed the incidence of molar pregnancy to be 14.9%, 13.4%, and 14.9%, respectively [5-7].

In 2002, the International Federation of Gynecology and Obstetrics (FIGO) established new criteria for the diagnosis of persistent gestational trophoblastic neoplasia after a molar pregnancy. Persistent trophoblastic disease is determined on the basis of the FIGO criteria 2000 [8]: (a) When the plateau of hCG persists for four consecutive measurements over a period of 3 weeks or longer; (b) When there is a rise in hCG over three consecutive weekly measurements, lasting for at least 2 weeks or more; (c) Persistent or recurrent uterine hemorrhage with a persistently detectable βHCG level for 6 months or more; (d) If there is a histologic diagnosis of choriocarcinoma.

Hyper glycosylated HCG level is believed to be a marker for Persistent Gestational Trophoblastic Neoplasia and response to chemotherapy is associated with the presence of hyper glycosylated HCG. So, estimation of hyper glycosylated HCG levels has a potential predictive value but is insufficiently sensitive to base treatment decisions [9].

The diagnosis of persistent gestational trophoblastic neoplasia (PGTN) is primarily based on the measurement of serum β-hCG levels after evacuation [10]. So serial β-hCG levels remain the best method to monitor and follow up on molar pregnancy and for determining the response to treatment. In case of persistent trophoblastic disease (PTD) following molar pregnancy, trophoblastic activity persists after evacuation of hydatidiform mole, and there is a subsequent rise or plateau of β-hCG in blood. PGTN can be easily identified through serial β-hCG measurements following molar evacuation [11].

The serum human chorionic gonadotropin (hCG) level is a reliable marker for detecting persistent GTN after surgical evacuation of molar pregnancy. The hCG level is closely linked to the clinical progression of gestational trophoblastic disease (GTD), and serial measurements of hCG are essential for detecting any rise or persistent plateau in its levels, which typically indicates the need for treatment.

Pre-evacution hCG level above 100,000 mlu/ml have been found to predict persistent disease, but never with sufficient precision to guide management [12].

A study was conducted between January 2000 and June 2010, involving 467 patients with complete molar pregnancies at the Department of Obstetrics and Gynecology, Chonnam National University Medical School, Gwangju, Republic of Korea. The study aimed to determine whether the serum human chorionic gonadotropin (hCG) levels and their ratio during the two weeks after evacuation could predict persistent gestational trophoblastic neoplasia (GTN) in patients with complete molar pregnancies [13]. This study was conducted to correlate the post evacuation β-hCG level with the development of PGTN considering multidimensional effect of GTN on women's health.

Objective

- The aim of the study was to evaluate the relationship between post-evacuation serum β-hCG levels and the occurrence of persistent gestational trophoblastic neoplasia in patients at a tertiary care center.

METHODOLOGY & MATERIALS

This cross-sectional study was conducted at the Outpatient Department of Gynecological Oncology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, between January 2021 and December 2021, focusing on patients with histopathologically confirmed molar pregnancy. A total of 50 participants were recruited and monitored for post-evacuation serum β-hCG levels to investigate the correlation with persistent gestational trophoblastic neoplasia (PGTN).

Inclusion Criteria:

- Patients with histopathologically confirmed molar pregnancy.

Exclusion Criteria:

- Patients with diagnosed abortion (e.g., missed or incomplete abortion).
- Patients with a history of hysterectomy due to molar pregnancy.
- Patients who refused to participate in the study.

Persistent gestational trophoblastic neoplasia (PGTN) was defined as the persistence of gestational trophoblastic disease (GTD) marked by an elevated beta human chorionic gonadotrophin (β-hCG) level according to FIGO criteria 2000. Informed written consent was obtained from each participant, ensuring confidentiality and voluntary participation. Detailed medical history and clinical examinations were conducted, with molar pregnancy confirmed via ultrasonography and serum β-hCG levels. After evacuation, patients were advised to have weekly serial serum β-hCG measurements until remission, followed by monthly measurements for six months. All information was recorded on a molar card. The study was approved by the Institutional Review Board (IRB) of BSMMU, and participants were thoroughly informed about the study's purpose, benefits, and risks. Participation was voluntary, and confidentiality was assured. Data analysis was

performed using SPSS version 20, with continuous variables presented as means with standard deviations and categorical variables as counts with percentages. Differences between groups were analyzed using unpaired t-tests and chi-square tests. Repeated measures of log-transformed β-hCG concentrations at four consecutive time points were used to predict GTN. ROC curves were constructed to assess the diagnostic accuracy of β-hCG levels, and the area under the curve (AUC) was calculated. Multivariate logistic regression models were used to predict the risk of persistent GTN, adjusting for potential confounding variables, with a significance level set at $p<0.05$.

RESULTS

Table 1: Socio-Demographic Characteristics and Their Association with GTN Status (n=50)

Socio-Demographic Character		GTN Positive (n=7)		GTN Negative (n=43)		p-value
		n	%	n	%	
Age (Years)	<20	5	71.4	7	16.3	
	20-40	0	0.0	16	37.2	
	>40	2	28.6	20	46.5	
	Mean±SD	25±11.28		34.28±9.59		[a]**0.024**[s]
	Range (min-max)	18-42		18-44		
Monthly Income (Tk)	<6000	6	85.7	13	30.2	[b]**0.038**[s]
	6001-15000	1	14.3	9	20.9	
	15001-30000	0	0.0	13	30.2	
	>30000	0	0.0	8	18.7	
Body Mass Index	Underweight (<18.5)	7	100.0	21	48.8	[b]**0.040**[s]
	Normal weight (18.5-24.5)	0	0.0	18	41.9	
	Overweight (25-29.9)	0	0.0	4	9.3	

The socio-demographic characteristics and their association with GTN status reveal significant differences between the groups. The mean age of GTN-positive patients was 25±11.28 years (range: 18–42 years), compared to 34.28±9.59 years (range: 18–44 years) in the GTN-negative group. A substantial majority of GTN-positive patients, 6 (85.7%), had a monthly income of less than 6000 TK, compared to 13 (30.2%) in the GTN-negative group. Additionally, all GTN-positive patients, 7 (100.0%), were underweight, whereas only 21 (48.8%) of GTN-negative patients fell in this category. Notably, nearly three-fourths of GTN-positive patients, 5 (71.4%), were under 20 years of age, while this was true for only 7 (16.3%) of GTN-negative patients. Statistically significant differences were observed between the two groups regarding age, monthly income, and body mass index ($p<0.05$).

Table 2: Association of GTN Status with Presenting Symptom (n=50)

Presenting Symptom		GTN Positive (n=7)		GTN Negative (n=43)		p-value
		n	%	N	%	
Duration of PV Bleeding	0–2 Weeks	6	85.7	43	100.0	**0.140**[ns]
	>6 Months	1	14.3	0	0.0	
Lower Abdominal Pain	Present	6	85.7	41	95.3	**0.319**[ns]
	Absent	1	14.3	2	4.7	
History of Abortion	Present	0	0.0	17	39.5	**0.041**[s]
	Absent	7	100.0	26	60.5	
H/O Expulsion of Grape-like Vesicles	Yes	7	100.0	26	60.5	**0.041**[s]
	No	0	0.0	17	39.5	
Size of the Vesicle	>1 cm	0	0.0	33	76.7	**0.001**[s]
	>2 cm	7	100.0	10	23.3	
Gestational Age	0–8 Weeks	2	28.5	20	46.5	**0.268**[ns]
	8–12 Weeks	4	57.1	22	51.1	
	>12 Weeks	1	14.2	1	2.3	
H/O Thyrotoxic Features	Present	6	85.7	11	25.6	**0.001**[s]
	Absent	1	14.3	32	74.4	
H/O Mole in Previous Pregnancy	Present	5	71.4	9	20.9	**0.005**[s]
	Absent	2	28.6	34	79.1	
Family History of Molar Pregnancy	Molar Pregnancy	4	57.1	0	0.0	**0.000**[s]
	Choriocarcinoma	2	28.5	0	0.0	
	No	1	14.2	43	100.0	

This table shows the association of presenting symptoms with GTN status among the patients (n=50). The duration of PV bleeding was 0–2 weeks in 6 (85.7%) GTN-positive cases and 43 (100.0%) GTN-negative

cases. Almost all patients, 6 (85.7%) in the GTN-positive group and 43 (100.0%) in the GTN-negative group, reported lower abdominal pain. A history of abortion was absent in 7 (100.0%) GTN-positive patients. A history of the expulsion of grape-like vesicles was found in all 7 (100.0%) GTN-positive cases and in 26 (60.5%) GTN-negative cases. Gestational age was mostly 8–12 weeks in 4 (57.1%) GTN-positive patients and in 22 (51.1%) GTN-negative patients. All 7 (100.0%) GTN-positive patients had vesicle sizes >2 cm. Nearly three-fourths, or 5 (71.4%), of GTN-positive patients had a history of molar pregnancy in previous pregnancies, compared to 9 (20.9%) in the GTN-negative group. A majority of subjects had a history of thyrotoxic features, 6 (85.7%) in the GTN-positive group and 11 (25.6%) in the GTN-negative group.

The differences in the history of abortion, expulsion of grape-like vesicles, size of the vesicles, history of mole in previous pregnancies, thyrotoxic features, and family history of molar pregnancy were statistically significant ($P < 0.05$) between GTN-positive and GTN-negative patients.

Table 3: Correlation of PGTN Status with Initial Post-Evacuation β-hCG Level (n=50)

Initial β-hCG Levels (mIU/mL)	GTN Positive (n=7)		GTN Negative (n=43)		p-value
	n	%	n	%	
<100,000	0	0	22	51.2	0.011
>100,000	7	100	21	48.8	

Table 3 shows that the initial post-evacuation β-hCG levels were >100,000 in all 7 (100.0%) GTN-positive cases and in 21 (48.8%) GTN-negative cases. The difference in initial β-hCG levels was statistically significant ($P < 0.05$) between the GTN-positive and GTN-negative groups.

Table 4: Comparison of Mean Log-Transformed β-hCG Values at Different Time Points (n=50)

Week	GTN Positive (n=7)		GTN Negative (n=43)		p-value
	Mean ± SD	Range (min-max)	Mean ± SD	Range (min-max)	
1st Week	4.68 ± 0.49	3.78, 5.25	4.69 ± 0.42	3.33, 5.08	0.954^{ns}
2nd Week	4.32 ± 0.54	3.48, 4.90	4.37 ± 0.59	1.64, 4.95	0.834^{ns}
3rd Week	4.12 ± 0.51	3.36, 4.61	3.88 ± 0.71	1.63, 4.94	0.396^{ns}
4th Week	4.04 ± 0.74	3.18, 4.81	3.47 ± 0.78	1.43, 5.46	0.077^{ns}
5th Week	4.15 ± 0.68	2.88, 4.85	3.01 ± 0.85	0.85, 4.93	0.001^{s}
6th Week	4.09 ± 0.76	2.82, 4.83	2.41 ± 0.91	0.70, 4.18	0.001^{s}
7th Week	4.34 ± 0.94	2.34, 4.96	1.82 ± 0.70	0.48, 3.40	0.001^{s}
8th Week	3.99 ± 1.18	2.18, 5.00	-1.31 ± 0.77	-2.00, 2.36	0.001^{s}

Table 4 shows the descriptive statistics for β-hCG levels, as well as p-values for comparing the mean β-hCG levels between women with and without GTN at different time points. It was observed that the mean β-hCG at the 1st, 2nd, 3rd, and 4th weeks was similar in both the GTN positive and negative groups. However, the mean β-hCG in the 5th week was 4.15±0.68 in the GTN positive group and 3.01±0.85 in the GTN negative group. The mean β-hCG in the 6th week was 4.09±0.76 in the GTN positive group and 2.41±0.91 in the GTN negative group. In the 7th week, the mean β-hCG was 4.34±0.94 in the GTN positive group and 1.82±0.7 in the GTN negative group. The mean β-hCG in the 8th week was 3.99±1.18 in the GTN positive group and -1.31±0.77 in the GTN negative group. The differences in β-hCG levels in the 5th, 6th, 7th, and 8th weeks were statistically significant ($P<0.05$) between the GTN positive and negative groups. The results suggest that the β-hCG values from weeks 5 to 8 have greater predictive power for discriminating between women with and without GTN.

Table 5: Power of Log-Transformed β-hCG Values for Predicting GTN at Different Time Points (n=50)

Weeks	Cutoff Value	Sensitivity (%)	Specificity (%)	AUC
ß-hCG 1wk	4.6	71.4	27.9	0.513
ß-hCG 2wk	4.61	71.4	37.2	0.505
ß-hCG 3wk	4.45	74.4	42.9	0.601
ß-hCG 4wk	4.06	79.1	57.1	0.698
ß-hCG 5wk	3.7	83.7	71.4	0.852
ß-hCG 6wk	3.63	86	75.1	0.907
ß-hCG 7wk	2.62	86	85.7	0.977
ß-hCG 8wk	1.59	97.7	100	0.997

Table 5 shows the comparison of the mean log-transformed β-hCG values at different time points. The table indicates that β-hCG with a cutoff value of ≥4.60 predicts PGTN with a sensitivity of 71.4% and

specificity of 27.9%, with an area under the curve (AUC) = 0.513 in the first week after evacuation. The sensitivity and specificity of β-hCG increased in subsequent follow-up weeks after evacuation for the prediction of GTN.

The table also displays the sensitivity, specificity, and AUC obtained from the ROC curve analysis for the estimated probabilities, as well as the power of β-hCG levels to predict PGTN, separately for weeks 0 to 8. The indices (sensitivity, specificity, and AUC), based on the best cutoff points for the estimated probabilities, show that β-hCG levels from all weeks had the best power to predict PGTN (AUC = 99.7%).

The sensitivity and specificity of β-hCG increased in the 5th to 8th weeks after evacuation for predicting PGTN.

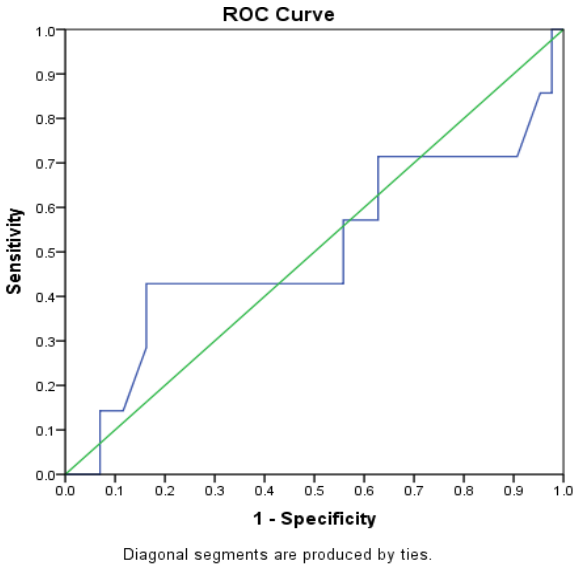

Figure 3.4.1: ROC curve of β-HCG for prediction at 1st week

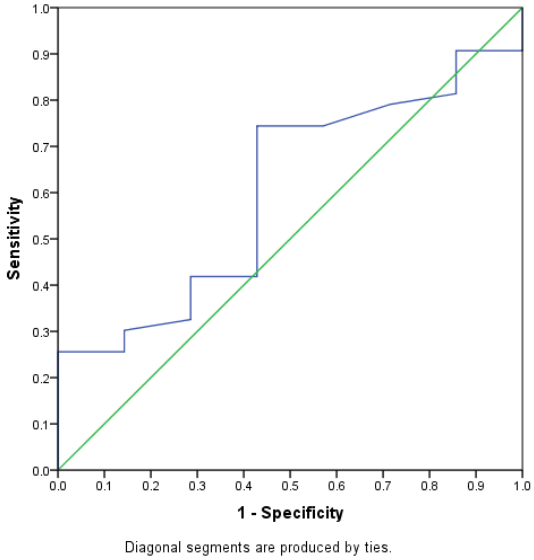

Figure 3.4.2: ROC curve of β-HCG for prediction at 2nd week

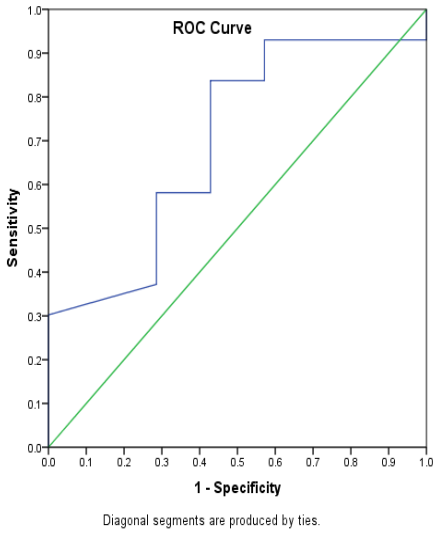

Figure 3.4.3: ROC curve of β-HCG for prediction at 3rd week

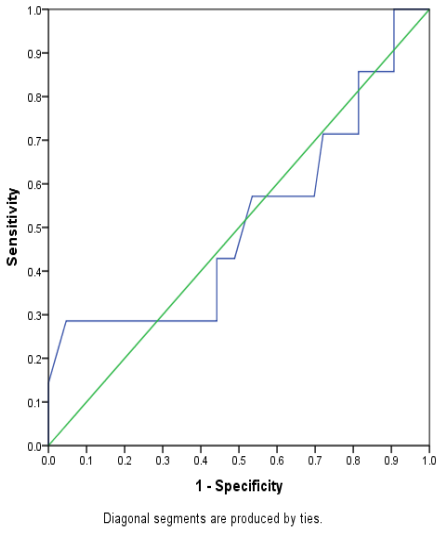

Figure 3.4.4: ROC curve of β-HCG for prediction at 4th week

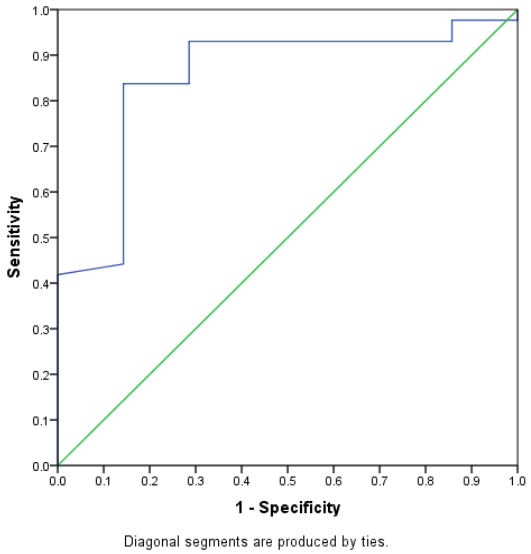

Figure 3.4.5: ROC curve of β-HCG for prediction of 5th week

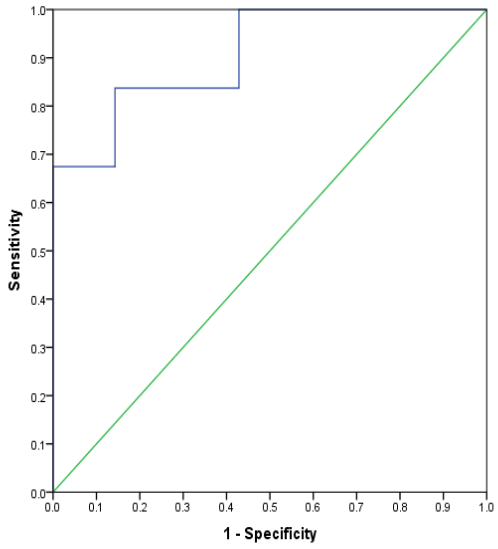

Figure 3.4.6: ROC curve of β-HCG for prediction of 6th week

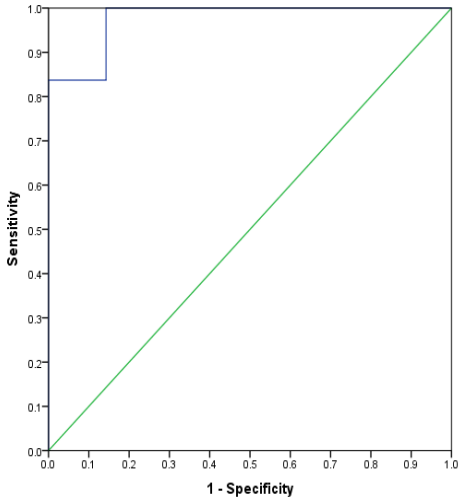

Figure 3.4.7: ROC curveof β-HCG for prediction of 7th week

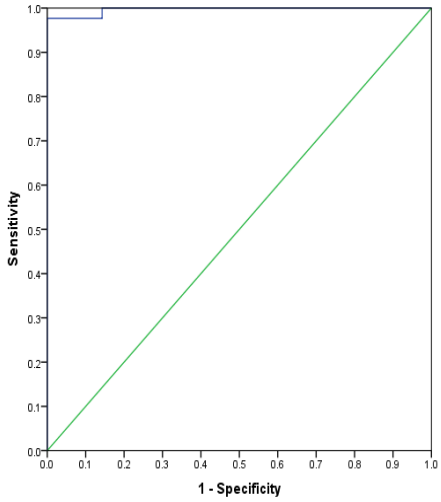

Figure 3.4.8: ROC curve of β-HCG for prediction of 8th week

Figure 1: ROC Curves of Log-Transformed β-hCG Values for Predicting GTN at Different Time Points

ROC Curves of Log-Transformed β-hCG Values for Predicting GTN from 5th to 8th Week

- **5th Week Analysis**: Sensitivity of 83.7% and specificity of 71.4%, with an Area Under the Curve (AUC) = 0.852.
- **6th Week Analysis**: Sensitivity of 86.0% and specificity of 75.1%, with an AUC = 0.907.
- **7th Week Analysis**: Sensitivity of 86.0% and specificity of 85.7%, with an AUC = 0.977.
- **8th Week Analysis**: Sensitivity of 97.7% and specificity of 100.0%, with an AUC = 0.997.

DISCUSSION

This cross-sectional study was carried out to explore the correlation of post-evacuation serum β-hCG levels with the development of Persistent Gestational Trophoblastic Neoplasia (PGTN) in patients with hydatidiform mole. A total of 50 patients with persistent gestational trophoblastic disease were included in this study, who had been visiting the outpatient department of the Gynecological Oncology Department at Bangabandhu Sheikh Mujib Medical University, Dhaka, between January 2021 and December 2021.

The present study aimed to determine PGTN after the evacuation of molar pregnancy according to FIGO Criteria 2000, evaluate the trend of β-hCG concentration after molar evacuation, and investigate the power of this marker in the early prediction of individuals with PGTN. In general, this study revealed that the trend of β-hCG concentration during follow-up after molar evacuation in women with hydatidiform mole may be considered an appropriate marker for predicting PGTN. Early detection of GTN can help physicians initiate treatment at an early stage and prevent the

consequences of this disease, such as metastasis and death.

A total of 7 (14%) patients developed persistent GTN among 50 hydatidiform mole patients according to FIGO Criteria 2000, which is similar to other studies showing rates of 14.9% and 13.4%, respectively [5,6]. It was observed that three-fourths (5, 71.4%) of the subjects were aged <20 years, and 2 (28.6%) were >40 years in the PGTN-positive group. The mean age was 25 ± 11.28 years (range: 18–42 years). In this study, age was significantly associated with the development of PGTN (P = .024). The findings are comparable to another study where the mean age was 35.13 ± 10.01 years (range: 17–50 years), and the association was statistically significant (P = .024) [14]. In other studies, it was observed that 92.1% (20–34 years), with a mean age of 23.02 ± 2.96 years (range: 18–35 years), had an increased risk of persistent disease [15]. Early marriage and early conception may account for the lower mean age in this study.

The majority, 6 (85.7%) of the study subjects in the PGTN-positive group, had a monthly income <6,000 Taka compared to 18 (41.9%) in the PGTN-negative group, and this was significantly associated with the development of PGTN (P = .038). A study revealed a similar association between low socioeconomic status and β-hCG regression [16].

Most of the patients, 7 (100%) in the PGTN-positive group and 21 (48.8%) in the PGTN-negative group, were underweight (BMI <18.5). BMI was significantly associated with the development of PGTN (P = .040). A study revealed a similar association with the current study [17].

In this study, it was observed that the duration of PV bleeding was 0–2 weeks in 6 (85.7%) patients in the PGTN-positive group and in 43 (100%) patients in the PGTN-negative group. H/O PV bleeding was not associated with the development of PGTN (P = .140), probably due to the small sample size in this study. A similar result was observed in another study where vaginal bleeding was not significant in predicting PGTN [18].

Almost all of the patients, 6 (85.7%) and 41 (95.3%) in the positive and negative groups, respectively, had lower abdominal pain, which was not associated with the development of PGTN. A study reported the same result as the current study [10].

H/O abortion was absent in all 7 (100%) patients in the PGTN-positive group, which had a significant association with the development of PGTN. Another study showed that H/O abortion was absent in 33 (86.8%) patients who developed PGTN [14].

H/O expulsion of grape-like vesicles was found in all 7 (100%) patients in the PGTN-positive group and 26 (60.5%) in the PGTN-negative group, which had a strong association with the development of PGTN (P = .041). A study observed that 15 (60%) of patients had H/O passage of grape-like vesicles, which was associated with persistent PGTN [19].

In the PGTN-positive group, all 7 (100%) had vesicle sizes greater than 2 cm (P = .001). The gestational age of molar pregnancy was mostly 8–12 weeks in 4 (57.1%) patients in the PGTN-positive group and in 22 (51.1%) patients in the PGTN-negative group, which showed no association with the development of PGTN (P = .268). Similarly, another study showed no significant association between gestational age (8–12 weeks) and PGTN development (P = .583) [20]. Other studies conducted in Bangladesh reported that 40% of patients presented with gestational ages of 12–16 weeks, and 30.1% presented between 8–11 weeks, respectively [21,22].

Most patients (6, 85.7%) in the PGTN-positive group had a history of thyrotoxic features, which showed a significant association with PGTN (P = .001). A study reported that 21% of patients presented with hyperthyroidism [23].

Nearly three-fourths (5, 71.4%) of subjects in the PGTN-positive group had a history of mole in a previous pregnancy, compared to 9 (20.9%) in the PGTN-negative group, demonstrating a strong association with PGTN (P = .005). However, a study found no significant association, as only 3 out of 109 patients had a history of mole in previous pregnancies [13].

This study revealed family histories of molar pregnancy in 4 patients (57.1%), choriocarcinoma in 1 patient (14.2%), and no family history of PGTN in 2 patients (28.5%). A family history of molar pregnancy showed a strong association with the development of PGTN (P = .000). In contrast, another study reported that 62 (93.9%) of 81 patients had no significant family history of mole (P > .99) [20].

Initial post-evacuation β-hCG levels were greater than 100,000 mIU/mL in all PGTN-positive cases, compared to 21 patients (48.8%) in the PGTN-negative group, showing a significant association with PGTN development. Another study found that initial post-evacuation β-hCG levels above 100,000 mIU/mL in 23 (62%) patients were significantly associated with PGTN [23].

In this study, descriptive statistics and P values were used to compare mean β-hCG levels between women with and without PGTN at various time points (1st to 8th weeks) after molar evacuation. P values indicated no significant differences in mean β-hCG

levels during the first to fourth weeks; however, a significant association was observed in weeks 5 to 8 (P = .001). These findings suggest that β-hCG levels in weeks 5 to 8 had greater predictive power for identifying women with PGTN. One study similarly reported that median β-hCG levels two weeks post-evacuation were significantly higher in the PGTN group compared to the remission group [13]. Another study defined rising β-hCG titers as increasing levels over two or more weekly measurements and persistent titers as elevated levels after 16 weeks of evacuation [24]. In the current study, elevated β-hCG levels were first observed between weeks 5 and 8.

Most patients with β-hCG levels exceeding 1,000 mIU/mL at the fifth week after evacuation subsequently developed persistent trophoblastic disease. In contrast, more than 90% of spontaneous resolution cases had β-hCG levels below 100 mIU/mL by the eighth week. These findings highlight the importance of β-hCG levels at weeks 5, 8, and 20 for predicting persistent trophoblastic disease [25].

Another study suggested that free β-hCG concentrations rise rapidly, peaking at 8–9 weeks of gestation, followed by a gradual decline over the next 11–12 weeks [26].

In this study, sensitivity, specificity, and AUC values from ROC curve analysis were calculated for weeks 0–8 to assess the predictive power of β-hCG levels for PGTN. These indices, based on the best cutoff points, demonstrated that β-hCG levels from all weeks had strong predictive power.

Overall, the trend of β-hCG concentrations during three consecutive weeks post-evacuation in women with hydatidiform mole appears to be an effective marker for predicting PGTN. The results showed that more than 97% of women with PGTN were correctly classified, emphasizing the importance of the β-hCG trend in weeks 5–8.

One study indicated that the hCG regression rate (hCG divided by initial hCG) could predict PGTN with 48.0% sensitivity and 89.5% specificity (AUC = 0.759) by the second week after evacuation. Notably, this study focused only on patients with initial hCG levels above 100,000 IU/L [13].

Utilizing normal β-hCG regression curves is a common approach for predicting PGTN. However, this study differs from others by considering repeated measures of β-hCG concentrations longitudinally, whereas most other studies used cross-sectional analyses. Repeated measures provide more information than single observations, and the longitudinal ROC curve allows the inclusion of individual covariates (e.g., demographic characteristics, laboratory indices), potentially improving predictive accuracy.

Limitations of the study

This study had some limitations:

- The study was conducted at a single tertiary care hospital in Dhaka, limiting the generalizability of the results to the broader population of the country.
- The study was completed within a short time frame due to constraints related to the investigator's studentship status, impacting resources available for data collection and analysis.
- The small sample size limits the external validity and statistical power of the study, reducing the ability to generalize the findings.
- The cross-sectional study design lacked a comparison group, and the identified risk factors for persistent disease require validation through analytic observational studies for more robust conclusions.

CONCLUSION

This study aimed to determine the correlation between post-evacuation serum β-hCG levels and the development of persistent gestational trophoblastic neoplasia (PGTN) in patients with hydatidiform mole. Persistent GTN was diagnosed in 7 (14%) of the 50 women based on the FIGO criteria 2000. Younger age (<20 years) and a history of abortion with thyrotoxic features, expulsion of grape-like vesicles, previous molar pregnancy, and family history were significantly associated with the development of PGTN (P<0.05). Significant risk factors identified for PGTN included vesicles with cystic structures inside the uterus (P=0.005), vesicle size >2 cm (P=0.001), and theca lutein cysts >6 cm (P=0.029). Additionally, a raised initial β-hCG >100,000 (P<0.05) and a rising β-hCG trend post-evacuation were strong predictors for PGTN, with >97% diagnostic accuracy between 5-8 weeks on the ROC curve. Younger age was associated with a 1.17 times increased risk for developing GTN (OR = 1.17, P = 0.030). Early detection of PGTN allows for timely risk stratification and treatment.

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