International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Clinicopathological Study of Gestational Trophoblastic Diseases

Archana Devi Sankaran[1], A. L. Shanthi[2]

[1]Department of Pathology, Government Vellore Medical College, Vellore

[2]Department of Pathology, Thanjavur Medical College, Thanjavur

Abstract: ***Gestational Trophoblastic Diseases (GTD) are characterized by abnormal proliferation of different trophoblastic cells during placentation. Gestational Trophoblastic Diseases include complete mole, partial mole, invasive mole, placental site trophoblastic tumor and choriocarcinoma. The aim of the study is to determine the incidence of hydatidiform mole, invasive mole, persistent trophoblastic disease and choriocarcinoma and to evaluate the histomorphological features of Gestational Trophoblastic Diseases with light microscopy The study is conducted between three year period from October 2008 to September 2011. The total number of pregnancies encountered in the three years period was 34,649.Total no of live births reported was 33794.A total of 13,593 biopsies were received in the department of pathology, Thanjavur medical college during the period of 3years. Among these, 326 were gynecological neoplasms, The analysis of biopsies and hysterectomy specimens revealed 55 cases of hydatidiform mole, 1 case of invasive mole, 6 cases of choriocarcinoma and 1 case of persistent trophoblastic disease.The spectrum of gestational trophoblastic disease included in this study were hydatidiform mole 55(87.3%), invasive mole 1 (1.58%), choriocarcinoma 6 (9.5%). The incidence of gestational trophoblastic diseases is found to be 1 in 550 pregnancies. The incidence of hydatidiform mole is found to be 1 in 630 pregnancies , incidence of invasive mole is found to be 1 in 35714 pregnancies and the incidence of choriocarcinoma is found to be 1 in 5780 pregnancies .Hydatidiform mole was found to be highest in the age group of 21 – 30 years (70.9%), whereas choriocarcinoma was widely distributed in the age group of 21 – 40 years. Hydatidiform mole were more common in the primi para followed by para 3 and para 2. Choriocarcinoma was found to have an equal occurrence in 2nd, 3rd and 4th parity. Complete mole constituted about 69.08% of cases and partial mole constituted about 30.9 %cases . The incidence of gestational trophoblastic diseases was found to be 1 in 597 live births. Choriocarcinoma following an antecedent molar pregnancy and term pregnancy have an equal incidence.***

Keywords: Gestational Trophoblastic disease, Hydatidiform mole, Choriocarcinoma

1. Introduction

Gestational Trophoblastic Diseases (GTD) is one of the most fascinating of all gynecological neoplasms represents a spectrum of lesions characterized by abnormal proliferation and pathological aberrations occurring at different trophoblastic subpopulation and stages of trophoblastic differentiation during placentation. [21]

Gestational Trophoblastic Diseases include complete mole, partial mole, invasive mole, placental site trophoblastic tumor and choriocarcinoma. Recognition and separation of individual categories of Gestational Trophoblastic Diseases is important as each disease entity has distinctive clinical manifestations and requires different therapeutic approach. Gestational trophoblastic diseases (GTD) show varied ethnicity and geographical distribution. The incidence of GTD varies widely throughout the world being greatest in Asia.[10] According to WHO, vesicular moles have an incidence of 1:120 pregnancies in some areas of Asia compared to 0.6 – 1.1 per 1000 pregnancies in United States.[35] The prompt identification of malignant gestational trophoblastic neoplasia is important because a delay in the diagnosis may increase the patient's risk and adversely affect the response to treatment. All the patients with malignant gestational trophoblastic disease should undergo a complete evaluation aimed at identifying metastatic sites. Over the last 30 years major advances has taken place in the understanding and management of gestational trophoblastic diseases, but histopathological diagnosis is important to prevent the occurrence of metastatic sequelae in the majority of cases and to achieve high remission rate in those with metastatic disease.

2. Literature Survey

Gestational Trophoblastic Diseases (GTD) has been known since antiquity .Hippocrates writing 400 BC described hydatidiform mole as dropsy of uterus & attributed it to unhealthy water. Hertig referred to Gestational trophoblastic neoplasm as God's first cancer & man's first cure.[3] Ewings in 1910 devised a term chorioadenoma destruens, a type of hydatidiform mole which retained its villous stroma ,penetrated into myometrium occasionally extend into pelvic structures & rarely metastasing.[6] Hertz & Elston (1978), Park (1971) preferred the term Invasive mole for chorioadenoma destruens. Chiari in 1877 described choriocarcinoma also known as chorioepithelioma with its origin from the placental bed and its relationship with previous pregnancies.In 1894 Felix Merchand demonstrated that hydatidiform mole ,normal pregnancy and abortions preceed the development of choriocarcinoma. He described proliferation of syncytiotrophoblast & cytotrophoblast of the placental villi in molar pregnancy and established the fetal origin of trophoblasts. [16,19,31]In 1948 Hertz demonstrated that folic acid antagonist causes extensive fetal damage and fetal absorption. Thus the therapy for gestational trophoblastic diseases began. In 1956 the first patient with metastatic choriocarcinoma was cured by systemic administration of antifolate chemotherapeutic agent Methotrexate.[3] Hydatidiform mole presented as missed

abortions or an embryonic pregnancies by sonography without a prenatal suspicion of molar pregnancies.[20]

This highlights the importance of routine histopathological examination of products of conception to diagnose gestational trophoblastic diseases.

WHO CLASSIFICATION OF GESTATIONAL TROPHOBLASTIC DISEASES:[35]

Trophoblastic neoplasm
Choriocarcinoma
Placental Site Trophoblastic Tumor
Epitheloid Trophoblastic Tumor

Molar Pregnancies
Hydatidifrom mole
Complete
Partial
Invasive

Aim

1) To study the number of Gestational Trophoblastic Diseases received in the Department of pathology , Thanjavur medical college ,Thanjavur - 3 years duration , from October 2008 to September 2011.
2) To study the incidence of complete and partial mole , invasive mole, choriocarcinoma in relation to gestational trophoblastic diseases and gynecological tumors in our set up.
3) To study the pattern of occurrence of Gestational trophoblastic diseases in relation to age , parity .
4) To evaluate the histomorphological features of Gestational Trophoblastic Diseases with light microscopy.

3. Problem Definition

Gestational Trophoblastic Diseases are pregnancy related tumors and patients are unaware of the condition. They are clinically diagnosed as missed abortions and undergo evacuation and curettage only. So the chances of missing GTD is higher. Studies have shown that the incidence of gestational trophoblastic diseases is higher in India and it is important to identify these cases to prevent the occurrence of metastatic sequelae and to achieve high remission rate in those with metastatic disease.

4. Methodology and Approach

This study was conducted in the Department of Pathology, Thanjavur medical college, Thanjavur over a period of three years from October 2008 to September 2011.The total number of biopsy specimens received during this period of 3 years at Thanjavur Medical College was 13,593.Out of the 13,593 biopsy specimens reported, 63 cases of Gestational Trophoblastic Diseases were diagnosed during the period from October 2008 to September 2011. The material consisted of 5 hysterectomy specimen and remaining are 58 biopsies composed of expelled products from the uterus, uterine curretings and suction evacuation material. A clinico-pathological analysis of these cases was carried out.The clinical details were taken from the record room. The details of the gross examination of the specimens were obtained from the histopathology files from the Department of Pathology .The blocks and slides were retrieved from the files of Department of Pathology. Paraffin blocks were recut and the sections being 3-4 µ thick and stained with Haematoxylin and eosin. Gestational Trophoblastic Diseases were classified as per WHO Scientific Group. Since the incidence of Gestational Trophoblastic Disease is generally expressed in relation to total number of pregnancies or live births or gynecological tumors rather than incidence in total population, in this study the incidence of Gestational Ttrophoblastic Disease is calculated according to it.

5. Results

The present study consisted of 63 cases of Gestational trophoblastic disease diagnosed in the Department of Pathology, Thanjavur Medical College, Thanjavur during the period from October 2008 to September 2011. Histopathological examination of these biopsies and hysterectomy specimens revealed 55 cases of hydatidiform mole, 1 case of invasive mole, 6 cases of choriocarcinoma and 1 case of persistent trophoblastic disease. A clinicopathological analysis was carried out. A total of 13,593 biopsies were received in the department of pathology, Thanjavur medical college during the period of 3 years. Among these, 326 were gynecological neoplasms, of which gestational trophoblastic diseases constituted 19.32% . The spectrum of gestational trophoblastic disease included in this study were hydatidiform mole 55(87.3%), invasive mole 1 (1.58%), choriocarcinoma 6 (9.5%).The total number of pregnancies encountered in the three years period was 34,649.The gestational trophoblastic diseases occur as 1 in 550 (0.18%) pregnancies. The hydatidiform mole form 0.15% (1 in 630), invasive mole 0.028 % (1 in 35,714), choriocarcinoma 0.173% (1 in 5780). The total no of live births in the 3 yr study period was 33794. The incidence of GTD is 1 in 536 with respect to live births.

Table 1: Incidence of Hydatidiform mole, Invasive Mole, Choriocarcinoma, Persistent Trophoblastic Disease in relation to Total Number of pregnancies(34,649)

Type of GTD	No	Incidence
Hydatidiform mole	55	1 in 630
Invasive mole	1	1 in 35714
Choriocarcinoma	6	1 in 5780
Persistent trophoblastic disease	1	1 in 35714
Total GTD	63	1 in 550

The youngest case encountered in this study was 19 years old and oldest was 40 years. 69.8% of cases of gestational trophoblastic diseases occurred in the age group of 21 – 30 years , followed by 15.8% of cases which occurred in ≤20 years age group and 14.2% of cases occurred in the age group of 31 -40 years. Hydatidi form mole was found to be highest in the age group of 21 – 30 years (70.9%) ,whereas choriocarcinoma was widely distributed in the age group of 21 – 40 years. Incidence was found to be equal in 3rd and 4th decade of life in choriocarcinoma. Among the gestational

trophoblastic diseases, hydatidiform mole were more common in the primi para followed by para 3 and para 2.Choriocarcinoma was found to have an equal occurrence in 2nd, 3rd and 4th parity. The total no of gestatational trophoblastic disease in this study is 63 cases, among which 55 cases are hydatidiform mole. H. mole were classified as complete hydatidiform mole and partial mole by histopathological examination The no of cases of complete mole is 38, partial mole 17. The incidence of complete mole is 69.08%, Partial mole 30.9%. Out of the 6 cases of choriocarcinoma, 3cases were preceded by hydatidiform mole and 3 cases were preceded by term pregnancy, thus showing an equal incidence. The interval varies from 4 months to 9 yrs.The biopsy specimens in all the cases of molar pregnancy consisted of suction evacuation and curettage material with volume ranging from 2cc to 5cc mixed with blood clot, decidual tissue and multiple grape like vesicles of varying size. Vesicles had a thin transparent wall and clear fluid. Histopathology of complete mole showed markedly distened chorionic villi with central cistern, multifocal to circumferential proliferation of both syncytiotrophoblast and cytotrophoblast, stromal blood vessels are completely absent. Gross appearance of the partial mole varied from few villous structures with larger villi measuring about 3x2 cm to tissue with blood clot and some placental tissue measuring 2x1x1 cm. Histopathology of partial mole showed two population of enlarged hydropic villi and normal villi, central cistern are not well formed. Trophoblastic inclusions with few rudimentary blood vessels with nucleated red blood cells .

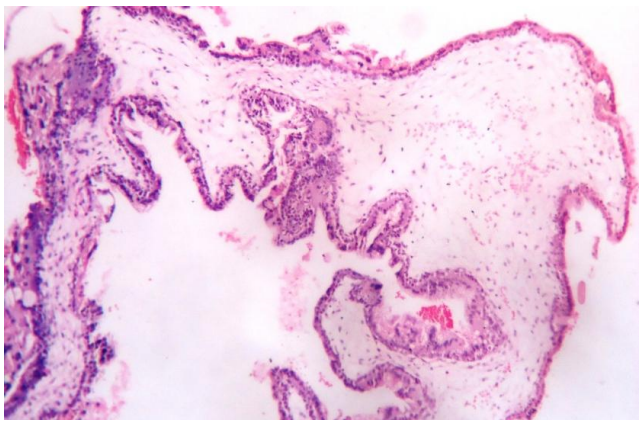

Figure 1: Histopathology of complete mole show trophoblastic proliferation and central cisterns

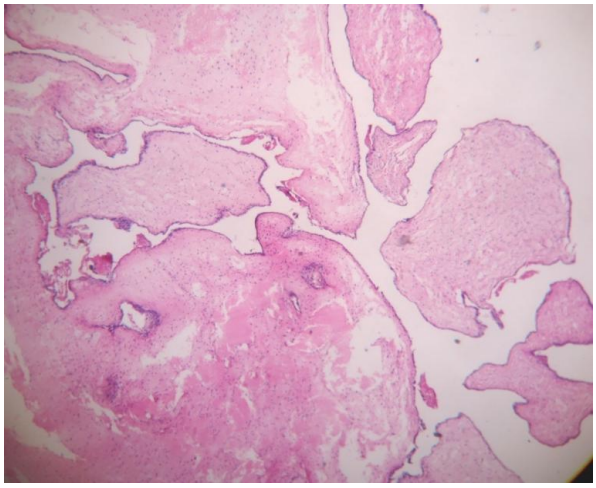

Figure 2: Histopathology of partial mole show trophoblastic inclusions

One specimen revealed soft friable necrotic ulceroproliferative growth arising from the lower end of the endometrial cavity invading into the myometrium and serosa measuring about 5x4cm . Histopathology revealed an extensive atypical trophoblastic cell proliferation with enlarged villi invading into myometrium and adjacent areas of hemorrhage and necrosis, this case was diagnosed histopathologically as invasive mole. 6 cases of choriocarcinoma was diagnosed.Hysterectomy specimens were received in 4 cases of choriocarcinoma and 2 cases were of suctional curettage material . Hysterectomy specimens consisted of uterus and cervix with adnexa measuring from 8x5x3 cm to 12x7x5cm. Gross examination of the hysterectomy specimen revealed an infiltrative growth within the endometrium measuring 5x4 cm invading into the myometrium with areas of hemorrhage and necrosis examination of the ovaries revealed theca lutein cyst. Another specimens revealed extensive hemorrhagic and necrotic mass distorting the uterus . Histopathology revealed a dimorphic population of mononucleated cytotrophoblasts, intermediate trophoblasts and multinucleated syncytiotrophoblast showing nuclear pleomorphism and hyperchromasia with adjacent areas showed necrosis and hemorrhage .

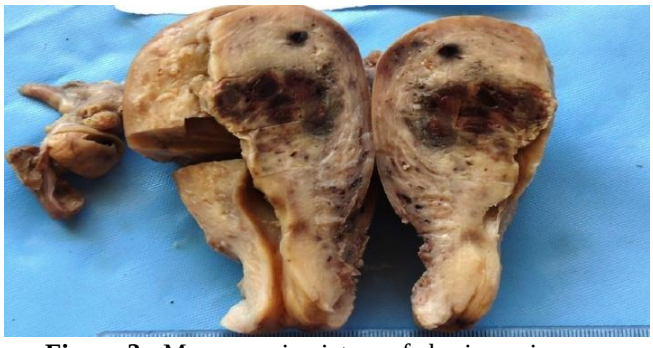

Figure 3: Macroscopic picture of choriocarcinoma .

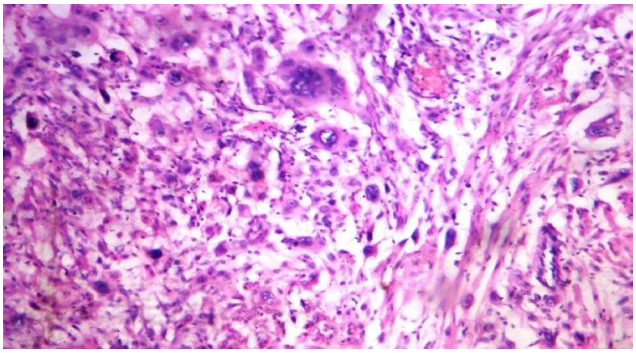

Figure 4: Histopathology of choriocarcinoma show pleomorphic trophoblastic cells infiltrating myometrium.

6. Discussion

Gestational Trophoblastic diseases constitute a spectrum of tumors and tumor like conditions characterized by proliferation of pregnancy associated trophoblastic tissue of progressive malignant potential. The lesions include complete and partial hydatidiform mole, invasive mole and choriocarcinoma.[21]In the present study, 13,593 surgical pathology specimens were analyzed over a period of 3 years. Out of these 326 were gynecological tumors. Gestational trophoblastic diseases were 63 cases constitute 19.32% of gynecological tumors. The spectrum of Gestational trophoblastic diseases included in this study was hydatidiform mole (87.3%), invasive mole (1.58 %), choriocarcinoma (9.5 %), persistent trophoblastic disease (1.58%). Dereje Negussie (2008) from Ethiopia reported 72% of hydatidiform mole and 15% of choriocarcinoma.[8] Khairunisha Nizam (2009) reported an incidence of 70% of hydatidiform mole , 23.3 % of invasive mole and 6.6% of choriocarcinoma .[12] Sakunthala et al reported 88.88% of hydatidiform mole, 8.08 % of invasive mole and 3.03 % of choriocarcinoma.[25] The incidence of gestational trophoblastic diseases varied in different parts of the world. The incidence in the present study was reported with respect to total number of pregnancies and live births. The incidence of gestational trophoblastic diseases were found to be 1 in 550 pregnancies. Shahla karim & Ibrahim et al from Iraq (2010) reported an incidence of 1 in 314 pregnancies .[29]The incidence of hydatidiform mole in the present study was reported to be 1 in 630 pregnancies while Deebika Mukergee from Calcutta (2001) reported 1 in 460 pregnancies, Ben Tamime from Tunisia reported an incidence of 1 in 1124 pregnancies.[7],[2]The incidence of molar pregnancies with respect to total no of live births is found to be 1 in 536, which correlates with that of Savage .P from England reported an incidence of 1 in 591 live births .[27]The prevalence of gestational trophoblastic diseases is found to be high in our study compared with others. The incidence of hydatidiform mole in the present study was 1.58 per 1000 pregnancies which is higher than other studies by Charlottee lybol from Netherlands reported an incidence of 1.34 per 1000 and Moodley from South Africa reported an incidence of 1.2 per 1000 pregnancies, Tariq from Saudi Arabia reported an incidence of 0.94 per 1000 pregnancies. [5],[18],[32]The incidence of choriocarcinoma in this study was found to be 1 in 5780 pregnancies which correlates with that of Chattopadhyay from Saudi Arabia who reported an incidence of 1 an 6130 where as Deebika Murkegee from Calcutta reported an incidence of 1 in 3225 pregnancies. [4],[7]The age group of the patients ranged from 19 years to 40 years . The peak incidence was found to be in the age group of 21 – 30 years(69.8%) . This correlates with that of Saleem sadiq from Karachi (2006) who reported an increased incidence in the age group of 21 -30 years, Vaidya from Katmandu reported (60%) in the age group of 21-30 years.[26],[34] In the present study out of the total molar pregnancies 69.09% were complete mole and 30.9 % were partial mole which correlated with that of Mayun et al who reported 60.7% of complete mole and 35.7% of partial mole.[15] The ratio of complete to partial Hydatidiform mole in this study was found to be 2:1 which correlated with that of Deebika Mukergee from Calcutta to be 2.8:1 and Masakaru Fukunga reported a ratio of 3:1.[7],[14] In the present study gestational trophoblastic diseases were more common inprimi para (38.09%) which correlated with that of vaidhya from Katmandu reported 37.2%, Mongkol Benjapibal reported 47 % of cases in primipara. [34],[17] The histopathological features of complete hydatidiform mole which include distended chorionic villi with central cisterns and circumferential trophoblastic proliferation. [13],[23] Rex C Benteley reported that two distinct population of villi are characteristic of partial mole .Large edematous villi and small villi with some degree of fibrosis . Trophoblastic pseudoinclusions are not pathognomonic but highly suggestive of partial mole and evidence of fetal development is seen as nucleated red blood cells within the villous stroma which was also observed in our cases. [22]Ross S. Berkowitz reported the incidence of recurrent molar pregnancy is 1 in50 to 1 in 66 patients. After 2 episodes of gestational trophoblastic disease the risk of repeat trophoblastic tumor rises to 28% in a later pregnancy . [24]

There was one case of invasive mole in the present study that occurred in a 29 years women with gravid 4, para 2, live 1, abortion 1 which was preceded by a hydatidiform mole. Saleem sadiq et al reported invasive mole was the second commonest gestational tropoblastic disease constituted about 3.5% of gestational trophoblastic diseases and commonest in the age group of 31 -40 years.[26] In the present study invasive mole constituted about 1.58% of gestational trophoblastic disease and age was lesser than that reported by Saleem sadiq. [26]Shahla karim reported that extensive trophoblastic over growth and penetration of trophoblastic cells, whole villi into the myometrium is characteristic of invasive mole .[29] In this present study we encountered 6 cases of choriocarcinoma of which 3 had past history of hydatidiform mole and 3 cases has previous history of term pregnancy. The interval between the antecedent pregnancy and choriocarcinoma was 8 months, 9 years and 18 months respectively . Out of 6 cases of choriocarcinoma 3 were in third decade and 3 cases were in the fourth decade . Parity ranged from 3 to 5. All the six patients presented with bleeding per vagina. One case had a metastasis to lung and showed cannon ball opacities in chest x-ray. One case of choriocarcinoma presented with uterine perforation and hemoperitoneum which correlated with that of Seema Mehtha who reported a similar case. One case of choriocarcinoma followed by a term pregnancy died of the disease post operatively.[28] Smith reported that choriocarcinoma were

higher between 20 -39 years which correlates with our study. Joseph Miller reported that post – term gestational choriocarcinomas have a more extensive metastatic spread, less responsive to conventional chemotherapy and increased mortality, thus present as a specific risk factor.[11] Powles et al reported that a time interval of >2 – 8 years between antecedent pregnancy and diagnosis of gestational trophoblastic disease is of prognostic significance that they have poor outcome and need aggressive treatment . [33]The incidence of post molar choriocarcinoma is 5.4% in our study compared with that of Egwuatu reported 7%.[9] Al Sakka reported postpartum choriocarcinoma in 1 : 19,000 live births whereas in the present study it is found to be 1 in 11,363 live births .[1]

In this present study one case of 23 year women was diagnosed as persistent trophoblastic disease with a previous history of vesicular mole evacuated at 28 weeks of gestation presented clinically with history of bleeding per vagina for 6 weeks, serum β HCG measured was 2,00,000IU/ml, ovaries showed bilateral theca lutein cyst radiographically . Suction evacuation was done and histopathology revealed a trophoblastic proliferation of cytotrophoblast and syncytiotrophoblast with features of atypia . No villi was identified .

7. Conclusion

From this study of gestational trophoblastic diseases we conclude that

1) Incidence of Gestational Trophobalstic Disease (1**:** 550 pregnancies) is comparable with that of South East Asian countries and higher than that of other countries.
2) Hydatidiform mole (87.3%) forms the most common type of gestational trophoblastic disease.
3) Incidence of complete mole (69.08%) are more than the partial moles(30.9%).
4) Reproductive age group (21 - 30 years) is the most common age group for Gestational Trophoblastic Disease.
5) 5)Incidence of Invasive mole is 1 in 35714.
6) Incidence of choriocarcinoma is 1**:** 5780 deliveries in this study.
7) Choriocarcinoma following an antecedent molar pregnancy and term pregnancy have an equal incidence.

8. Future Scope

The incidence of gestational trophoblastic diseases is higher in India and this study highlights the necessity and importance of identifying these cases to prevent the catastrophes. This study emphasizes the importance of routine histopathological examination of products of conception to rule out microscopic molar changes, since there is an higher incidence of molar pregnancies progressing to choriocarcinoma , a highly metastasizing neoplasm. Every patient with complaints of bleeding per vagina following a molar pregnancy evacuation or a term pregnancy should be evaluated for choriocarcinoma. Early identification and treatment of choriocarcinoma with chemotherapy results in 100% cure. This study also emphasizes the importance of maintaining a Trophoblastic Diseases Registry for the follow up of these patients and their reproductive outcome.

References

[1] Al Sakka M., Rasul K.I. Dauleh W. Al Tamimi and Al Taher F. presentation and management of Post partum choriocarcinoma in Qatar . Qatar medical Journal volume 14 no1 june 2005
[2] Ben Temime Riadh , checchia abdellatif , hannachi wissal , attia Leila , Makhlouf Taher , Koubaa Abdelhamid Clinical analysis and management of Gestational Trophoblastic Diseases : A 90 cases study International journal of biomedical sciences 5(4) December page 321 -325 2009.
[3] Charles B. Hammond MD., Gestational Trophoblastic neoplasms: History of current understanding Obstretics and Gynecology Clinics of North America volume 15 no3 435 -441september 1988.
[4] Chattopadhyay SK., Sengupta BS., al-Ghreimil M, Edrees YB., Lambourne A. Epidemiologic study of gestational Trophoblastic diseases in Saudi Arabia Surgery Gynecological Oncology Nov ;167 (5) 393-398. 1988.
[5] Charlotte Lybol, Chris M.G. Thomas, Johan Bulten, Jos A.A.M. van Dijck, Fred C.G.J. Sweep, Leon F.A.G. Massuger Increase in the incidence of gestational Trophoblastic diseases in the Netherlands Gynecological oncology volume 121 issue 2 pages 334- 338.may 2011
[6] Christoper P. Crum , Kenneth R. Lee .Diagnostic Gynecological & Obstretic Pathology page no 1015 - 1038
[7] Deepika Mukherjee, Partha Mukherjee,Jyotirmoy Nath Malik Gestational Trophoblastic Disease A Review Journal of Obstretics and Gynecology of India volu 51 no 1 Jan /feb 2001.
[8] Dereje Negussie MD., Tefera Belachew MD., Profile of Gestational Trophoblastic diseases in two teaching hospitals in ADDIS –ABABA , Ethiopia Ethiopia Journal of Health sciences. Vol.17 march 2008.
[9] Egwuatu V.E., B.C. Ozumba Observations on molar pregnancy in Enugu , Nigeria International Journal of Gynecology and Obstretics volume 29 issue 3 219-225.july 1989
[10] Haines & Taylor and Fox Gynecological Pathology 5th edition . page no 1359-1416
[11] Joseph M .Miller , MD., Earl A. Surwit M.D., and Charles B .Hammond M.D.,Choriocarcinoma Following Term Pregnancy Obstretics and Gynecology volume 53 no 2 Febrauary 1979 .
[12] Khairunnisa Nizam , Gulfareen haider , Nizamuddin Memon , Ambreen Haider Gestational trophoblastic diseases : Experience at Nawabshah Hospital Journal Ayub Medical college 21 (1) 94 – 97 Abbottabad 2009.
[13] Masaharu Fukunaga M.D. Hidetaka KataBuchi M.D. Tetsuro Nagasaka M.D. Yoshiki Mikami M.D. Sachiko Minamiguchi M.D. Interobserver and Intraobserver variability in the diagnosis of hydatidiform mole American journal of surgical pathology volume 29 , number 7 July 2005

[14] Masaharu Fukunaga M.D , Shinichiro Ushigome MD., Yasuhiko Endo MD., Incidence of hydatidiform mole in a Tokyo hospital A 5 year prospective , morphological and flow cytometric study Human Pathology volume 26 issue 7 pages 758-764 july 1995
[15] Mayun A.A. Rafindadi R.H. M.S. Shehu Pathomorphology of molar gestations in Zaria Nigerian medical journal Volume 51 page 1-4. 2010
[16] M.K.Krishnan Menon, P.K.Devi, K.Bhasker Rao. Post Graduate Obstretics &Gynecology 4th edition
[17] Mongkol Benjapibal ,MD., Dittakarn Boriboonhirunsarn MD., Issaracha Suphanit ., Weerasak Wongtiraporn MD., Surin Tosukhowong M.D., Chaiyod Thirapakawong M.D., Somachaya Neungton M.D., Molar pregnancy : clinical Analysis of 151 Patients Thai Journal Of Obstretics and Gynecology volume 12 35 - 41.march 2000
[18] Moodely M., Tunkyi K., Gestational Trophoblastic syndrome : An audit of 112 patients .A south African experience . International journal of Gynecological cancer vol13 issue 3 234 – 239.march 2003
[19] Nadereh Behtash , Fatemeh Ghaemmaghami and Malihe Hasanzadeh Long term remission of metastatic placental site trophoblastic tumor (PSTT) : case report and review of literature World Journal of Surgical Oncology 3 : 34, 2005.
[20] Neil J.Sebire, Rosemary A Fisher and Helene C Rees Histopathological diagnosis of Partial and complete hydatidiform mole in the first trimester of pregnancy Pediatric and Developmental Pathology 6, 69-77, 2002
[21] Ralph S. Freeedman M.D. Guillermo Tortolero M.D. dilip K.Pandey. Anais Malpica M.D. Gestational trophoblastic diseases Obstetrics and Gynecology Clinics of North America volume 23 number 2 . 545 – 571.june 1996
[22] Rex C. Bentley Pathology of gestational Trophoblastic diseases clinical obstretics and gynecology volume 46 P no 513- 521., September 2003
[23] Richard M. conran MD Phd, Charles L. Hitchcock MD, Edwina J Popek ,Henry J Norris MD, Diagnostic considerations in molar gestations Human Pathology volume 24 no1 January 1993
[24] Ross S. Berkowitz M.D. and Donald P. Goldstein M. D. Molar Pregnancy New England Journal of Medicine 360 : 1639 – 1645, 2009.
[25] Sakuntala Chhabra, Ambreen Qureshi Gestational Trophoblastic neoplasm with special reference to invasive mole Journal of Obstretics and Gynecology of India volume 57 no 2 124- 127 march /april 2007
[26] Saleem Sadiq, Suchita Panjawani Gestational trophoblastic disease experience at the basic medical science institute , JPMC ,Karachi . Pakistan Journal of Medical Science volume 22 no4 December 2006.
[27] Savage P. William J., Wong SL., Short D. CasalboniS, CatalanoK, Seckl M., The demographics of molar pregbnancy in England and wales from 2000 – 2009. Journal reproductive medicine jul – aug ;55 (7-8) 341-345 .2010
[28] Seema mehta . choriocarcinoma leading to uterine perforation Journal of obstretics and gynecology india volume 52 april 2002
[29] Shahila karim Al Alaf , Deman Ibrahim Omer Prevalance and clinical observations of Gestational trophoblastic Diseases in Maternity Teaching Hospital in Erbil city WSEAS TRANSACTIONS on BIOLOGY and BIOMEDICINE Volume 7 issue 3 July 2010.30.Smith Harriet O, Qualls , Clifford Trends in Choriocarcinoma a 27 years prospective study obstretics and gynecology vol102 978-987,2003
[30] S.S.Ratnam A. Ilancheran Diseases of Trophoblast obstretics and gynecology clinics in North America volume 9 no3 539 -564.1982.
[31] Tariq Y. Khashoggi Prevalance of Gestational trophoblastic disease A singleinstitution experience Saudi Medical Journal volume 24 (12) 1329 – 1333, 2003.
[32] T .Powles, A Young ,A Sammit , J Stebbing ,D Short , M Bower , P M Savage ,M J Seckl and P Schmid The significance of the time interval between antecedent pregnancy and the diagnosis of high risk gestational trophoblastic tumors British Journal of cancer . 95: 1145 – 1147 ,2006
[33] Vaidya.A. Molar Preganancy – clinical trends at Maternity hospital .Post Graduate Medical Journal of Nepal volume 8no1 2008.
[34] World Health Organization Classification of Tumors International Agency for Research on Cancer Lyon press 2003

Author Profile

Archana Devi Sankaran, studied M.B.B.S at Govt Stanley Medical College, Chennai from 2002 -2008, completed M.D.Pathology at Thanjavur Medical College, Thanjavur, from 2009 – 2012, currently working as Assistant professor at Govt Vellore Medical College , Vellore .