

## ULTRASONOGRAPHIC AND HISTOLOGICAL STUDY OF PLACENTA IN NORMAL PREGNANCIES

TEWARI K. ● TYAGI S.P. ● SAXENA K. ● USMANI F. ● BEGUM R.

### SUMMARY

The present work was undertaken on 20 cases to study the placental ultrasonography in relation to histological changes during normal pregnancy at different gestational periods. The mean placental thickness in normal pregnancy was found to be maximum between 28-32 weeks gestation i.e.  $51.86 \pm 5.7$  mm and a progressive decrease was noted till term ( $43.7 \pm 4.5$  mm between 32-36 weeks and  $37.4 \pm 5.5$  mm after 36 weeks). Mean gestational age for appearance of grade I placenta was  $31.2 \pm 1.92$  wks. for grade II  $35.6 \pm 1.6$  wks. and for grade III  $37.5 \pm 1.2$  wks. Mean placental thickness of grade I placenta in normal pregnancy was  $49.7 \pm 5.4$  mm, Grade II was  $40 \pm 3.4$  mm and Grade III was  $34.2 \pm 3.6$  mm. Our correlative study of sonographic placental changes with histological changes showed that fibrinoid necrosis, stromal fibrosis and vasculo-syncytial membrane changes were significantly increased in grade III as compared to grade II placentae which is an expression of degenerative changes with the advancing gestation, while, syncytial knots and cytotrophoblastic cell proliferation increased insignificantly.

### INTRODUCTION

The placenta is a focus of increasing interest in modern obstetrics. As a major organ of nutrition and homeostasis, the placenta is essential for growth and

development and foetal well-being. According to Benerischke (1961), the placenta is the most accurate record to infant's prenatal experience and before advent of ultrasonography its evaluation was only possible after delivery. Ultrasound placentography was first described by Gottesfeld (1966) while Grannum

*Dept. of Obst. & Gynec. J.N. Medical College, A.M.U., Aligarh.*

*Accepted for Publication on 26.1.95*

et al (1979) proposed grading system for the maturation of placenta occurring with advancing gestational period. The present work was undertaken to study the placental ultrasonography in relation to histological changes occurring in normal pregnant women at different gestational period.

#### MATERIAL AND METHODS

The placental study was carried out on 20 cases of normal pregnancy in whom ultrasonography as well as histological examination was done. Serial placental sonographic scanning was done from 28 wks. onwards till term by Siemen's Imager model 2380 having transducer of 3.5 MHZ frequency, it was studied in relation to localization, grading (according to Grannum's classification) and thickness (maximum thickness between chorionic and basal plate) at different gestational periods. The placenta was subjected to histological examination. The Haematoxylin and Eosin staining was done and 200 villi studied in relation to each parameter (Syncytial knots, cytotrophoblastic cells, vasculosyncytial membrane, fibroid necrosis, basement membrane, stromal fibrosis and calcification) (see Fig.)

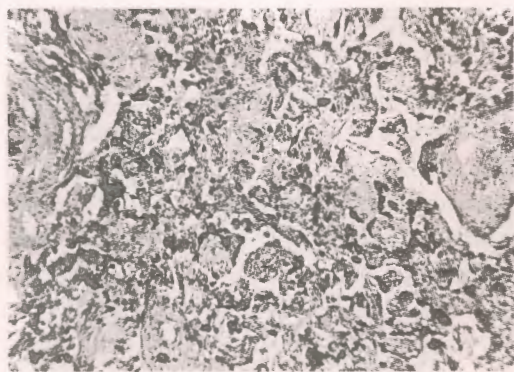


Fig. Normal Placenta H & E x 40 (x2.5)

#### OBSERVATION AND DISCUSSION

In the present study in 50% cases, placenta was located anteriorly (40% anterior midline and 10% anterior lateral) while it was fundal in 50% (25% Ant. fundal and 25% Post fundal). The mean placental thickness was found to be maximum between 28 to 32 weeks gestation i.e.  $51.88 \pm 5.7$  mm and a progressive decrease was noted till term ( $43.7 \pm 4.5$  mm) between 32 to 36 wks. and  $37.4 \pm 5.5$  mm after 36 wks (Table I). These findings were comparable to those of Grannum et al (1979) who observed that placental thickness increases linearly until 32 weeks of pregnancy after which there is a gradual decrease which is mediated by the degree of placental maturity. However, the mean gestational age of appearance of grade I placenta was  $31.2 \pm 1.92$  wks. for grade II  $35.6 \pm 1.6$  wks. and for grade III  $37.5 \pm 1.2$  wks. (Table II). The findings are in conformity with the findings of Grannum et al

(1979) who reported 31.11, 36.36 and 38.04 weeks of Grade I, II, III placenta respectively. The mean thickness of grade I placenta was  $49.7 \pm 5.4$  mm, Grade II was  $40 \pm 3.4$  and Grade III was  $34.2 \pm 3.6$  mm in the present study whereas according to Grannum's series it was 3.8 mm for grade I, 3.66 mm for grade II and 3.48 mm for grade III placenta.

Our correlative study of sonographic placental changes with histological changes (Table No. III) showed that fibrinoid necrosis, stromal fibrosis, vasculosyncytial membrane changes and calcification were significantly increased in grade III as compared to grade II placentae. Burnstein et al 1963 emphasized that fibrinoid material was



**Table I**  
**Mean Placental thickness at different periods of gestation**

Gestational age (weeks)	n	Mean placental thickness (mm)
28-32	15	51.86 + 5/7
32-36	15	43.70 + 4.5
Above 36	20*	37.40 + 5.5

\*This includes 5 cases of single scan.

**Table II**  
**Mean Placental thickness and Gestational age at different maturational grades**

Grading (weeks)	n	Mean Gest. age (weeks)	Mean placental thickness (mm)
Grade I	19	31.20 + 1.9	49.7 + 5.4
Grade II	20	35.60 + 1.6	40.0 + 3/4
Grade III	08	37.50 + 1.2	34.2 + 3.6

a form of senile amyloid which contains misspecified proteins due to an ageing process. Villous fibrosis is a hallmark of a reduced foetal villous perfusion and the formation of vasculo-syncytial membrane is a manifestation of villous maturation (Fox, 1978). The syncytial knots and cytotrophoblastic proliferation though increased in

grade III placentae but was not statistically significant. Syncytial knots have been considered as a degenerative phenomenon (Merrill, 1963) while Kubli & Budlinger, 1963 have indicated them to be an ageing change. However Cibils, 1974 was of the opinion that it was a response to trophoblastic ischaemic or hypoxia.

**Table III**  
**Histological features and Sonographic Placental grading**  
**in normal pregnancy**

Histological features	Normal	
	Gr.II (n=12)	Gr.III (n=8)
1. Syncytial knots		
0 - 30	11 (91.7)	6 (75)
30 - 60	1 (8.3)	2 (25)
Above 60	- -	- -
2. Cytotrophoblast Cells		
0 - 20	9 (75.0)	5 (62.5)
20 - 40	3 (25.0)	3 (37.5)
Above 40	- -	- -
3. Vasculosyncytial membranc		
0 - 5%	12 (100)	6 (75)
Above 5%	- -	2 (25)*
4. Fibrinoid necrosis.		
0 - 3%	12 (100)	5 (62.5)
Above 3%	- -	3 (37.5)*
5. Thickened Basement Membrane		
0 - 3%	12 (100)	8 (100)
Above 3%	- -	- -
6. Stromal fibrosis		
0 - 3%	12 (100)	6 (75)
Above 3%	- -	2 (25)*
7. Calcification		
Absent	7 (58.3)	1 (12.5)
Present	5 (41.7)	7 (87.5)

\* -  $P < 0.05$

**CONCLUSION**

Our study concludes that the histopathological ageing changes are well correlated with increasing sonographic grading of the placentae which is an expression of placental maturity.

**REFERENCES**

1. Benerischke K. : *Contemp Obs./Gyn.* 17, 117, 1961.
2. Burnstein R., Berns A.W. : *Am. J. Obstet. Gynec.* 74, 96, 104. 1963.
3. Cibils IA. : *Am. J. Obstet. Gynec.* 118, 256, 1974.
4. Fox H. (1978) *Placental Pathology in progress in Obstetrica and Gynaecol* vol. 3 Pg 47 Churchill Livingstone 1983.
5. Gottesfeld KR., Thomson HR., Homes JN., Taylor ES. : *Am. J. Obstet. Gynec.* 96, 538, 1966.
6. Grannum P., Berkowitz RL., Hobbins JC. : *Am. J. Obstet. Gynec.* 133, 915, 1979.
7. Kubli F., Budlinger H., Fox H. : Pg 149, W.B. Saunders, 1978.
8. Merrill J.A. : *Clin Obstet. & Gynec.* 6, 96, 1963.
9. Wigglesworth JS. : *J. Obstet Gynec. Brit. C'wealth* 69, 634, 1962.