INFLAMMATORY CHANGE IN THE PLACENTA AND APPENDAGES

by

PARVATI K. MALKANI,* F.R.C.O.G. F.A.C.S., F.A.M.S.

and

KAMAL BHASIN,** M.D.

Jeffcoate (1962) said that most Obstetricians for many centuries, have paid no more attention to foetal membranes than the care of a parturient woman demands. They have been content to note whether the bag of forewaters is ruptured or intact and after delivery, to see if any portion of the placenta or membranes is retained in the uterus.

The significance of leucocytic infiltration of the umbilical cord has been a subject of investigation and speculation for many years (Dominguez *et al* 1960). There are widely divergent views not only as to their etiological background but also regarding their significance in the clinical course of both mother and infant. Severe placental inflammation can be seen in the absence of clinical illness in infant or mother or detectable microorganisms (Benirschke 1962). Inflammation of the placenta and its appendages is characterised by leucocytic infiltration and the diagnosis depends upon the presence of polymorphonuclear leucocytes within the amnion, chorion and umbilical cord. Chorio-amnionitis is inflammation of the chorion and amnion, whether it be over the placenta or in the reflected membranes.

The "syndrome of infection of the amnion" was coined by Morison (1952). He states that it is difficult to assess the importance of this infection, and undoubtedly heavy reaction can occur in relation to the placental membranes without obvious injury to the foetus. The organisms are usually those normal to the birth canal and very few are regarded by the bacteriologist as virulent. This and the obvious difficulty of obtaining specimens without contamination allow most bacteriologists to dismiss summarily the organisms recovered as contaminants. Blanc (1959) called this condition "amnionic infection syndrome." The association of this "Syndrome" to perinatal infection is not clear. The inflammatory lesions occur much more frequently than overt infection of the mother or the infant and although bacterial infection is often presumed to be the cause of the inflammation, in many cases no bacteriologic evidence of infection is found (Maudsley *et al* 1966).

It is stated by Novak *et al* (1962) that frequently there are seen collections of polymorphonuclear leucocy-

Prof. of Obst. and Gynec.

***Senior Research Officer.*

Dept. of Obstetrics and Gynaecology, All-India Institute of Medical Sciences, New Delhi-16.

Received for publication on 3-10-1969.

tes in the chorionic plate, not associated with either prolonged labour, premature rupture of the membranes or febrile puerperia. The cause of this mild inflammation of the chorionic plate is not known, but it may be related to degeneration of underlying trophoblast. The degree of leucocytic infiltration is much more severe in instances of septic abortion, prolonged labour, premature rupture of the membranes, or following induction of labour by mechanical devices. The chorionic plate becomes loaded with inflammatory cells, and frequently bacteria can be demonstrated. If the infection is severe, the decidual plate, intervillous space and finally the villi become involved. The Wharton's jelly and the adventitia of the funic vessels become infiltrated with inflammatory cells when the cord begins to be macerated after the death of the foetus or in cases of severe intrapartum infection. Leucocytic infiltration of the cord occasionally occurs without demonstrable cause.

The incidence of chorio-amnionitis or foetal vasculitis is reported to vary from 10 to 39 per cent (Beckmann and Zimmer, 1931; Kuckens, 1938; Blanc, 1959; Benirschke and Clifford, 1959; Emig *et al* 1961; Maudsley *et al* 1966; Kelsall *et al* 1967). According to Blanc (1959) placental inflammation was three times as common in premature births as in term deliveries. Emig *et al* (1961) found an increased incidence of prematurity and perinatal death associated with inflammation of the membranes, placenta and umbilical cord. Siddall (1927 and 1928) found inflammation of the cord in 6 per cent of 1,000 infants. The incidence of inflammatory changes in the premature infants was 25 per cent. Inflammation of the umbilical cord was found in 18.5 per cent of still born infants. Fujikura and Benson (1964) state that 42 per cent of still born infants display moderate to marked degree of placentitis. McIlwaine (1952) observed that the occurrence of placentitis rose from 3.3 per cent in the first 6 hours after the rupture of membranes to 16.3 per cent between 6 and 24 hours, and to 51.7 per cent in those over 24 hours. Emig *et al* (1961) reported an increase in the inflammatory reactions of the placenta associated with the rupture of the membranes for 12 hours or longer. Inflammatory reactions are often associated with foetal hypoxia (Dominguez *et al* 1960; Widholm *et al* 1963), presence of meconium (Morison, 1952) or prolonged labour (Dominguez *et al* 1960).

Material and methods

Gross and microscopic study was carried out in 78 human placentae obtained from the labour room service of the All-India Institute of Medical Sciences, New Delhi.

Histological study

Sections from the proximal, middle and distal ends of the cord, a membrane roll, and a full thickness section of the placenta, including both maternal and foetal surfaces, were prepared from each placenta.

Rating, similar to that of Bourne (1962), was assigned to the histologic specimen, and was as follows:

Stage I: This consists of margination of polymorphonuclear leucocy-

tes along the intima of the vessel. (Fig. 6).

Stage II: The full thickness of the vessel wall shows leucocytic infiltration. (Fig. 7a and b.).

Stage III: Dense leucocytic infiltration of the vessel walls, Wharton's jelly in the case of the umbilical cord and chorion. (Fig. 8).

Stage IV: Dense leucocytic infiltration of vessel walls, Wharton's jelly, chorion and amnion. (Fig. 9 and Fig. 5).

Results

Of 76 placentas and appendages studied, 31 (40.8 per cent) placentae showed polymorphonuclear infiltration. Stage of inflammation is shown in Table I and Figs. 6, 7, 8, and 9.

Distribution of inflammatory change in the placenta and appendages associated with maternal and foetal complications is shown in Table II and Figs. 1 to 9.

The incidence of inflammation presented here is in general agreement with the findings of other investigators (Maudsley *et al*, 1966; Kelsall *et al*, 1967 and Wilson *et al*, 1964).

Premature rupture of the membranes occurred in 14 cases. Relationships of inflammation to premature rupture of the membranes is shown in Table III.

In all the cases of premature rupture of membranes, the membranes had ruptured for more than 48 hours earlier. Incidence of placental in-

TABLE I

Stage of inflammation

Stage	No. of placenta.	Percentage
I	1	1.3
II	3	3.9
III	27	35.5
IV	22	28.9

TABLE II

Distribution of inflammatory change in the placenta and appendages

Sites of inflammation.	No.	Placenta percentage	No maternal or foetal complications percentage.	Associated with maternal or foetal complications percentage.
Amniotitis	22	28.9	8.7	37.7
Chrionitis	31	40.8	26.0	47.7
Funiculitis	21	26.3	4.3	35.8
Deciduitis	55	72.3	56.5	79.2

TABLE III

Relationship of inflammation to premature rupture of the membranes

	No. of cases.	No. showing inflammation	Percentage
Rupture of the membranes at the end of the first stage.	23	6	26.0
Premature rupture of the membranes	14	9	64.3

flammation (64.3 per cent) is increased in cases of premature rupture of the membranes.

Incidence of placental inflammation in relation to period of gestation is shown in Table IV.

Inflammation of the placenta and its appendages was more frequently observed in cases of premature and postmature deliveries than in the case of a full term delivery.

The relationship of inflammation to toxaemia is shown in Table V.

The incidence of placental inflammation is high in toxaemic cases. The extent of inflammation was not related to the severity of toxaemia.

The relationship of inflammation to meconium staining of liquor is shown in Table VI.

The incidence of inflammation is high in association with meconium-stained liquor.

The association of inflammation to anaemia is shown in Table VII.

The incidence of inflammation is increased in anaemic cases.

Relationship of inflammation to foetal mortality is shown in Table VIII.

TABLE IV

Relationship of inflammation to period of gestation

Period of gestation in weeks.	No of cases	No. showing inflammation	Percentage
28—36	17	9	52.9
37—41	23	6	26.0
Above 42	5	4	80.0

TABLE V

Relationship of inflammation to toxaemia

	No. of cases	No. showing inflammation.	Percentage
Non-toxaemic	23	6	26.0
Toxaemic	11	7	63.6

TABLE VI

Relationship of inflammation to meconium staining of Liquor

	No. of cases	No. showing inflammation	Percentaege
No meconium	23	6	26.0
Meconium	14	9	64.3

TABLE VII

Relationship of inflammation to anaemia

	No.	No. showing inflammation	Percentage
Not anaemic	23	6	26.0
Anaemic	12	4	33.3

TABLE VIII
Relationship of inflammation to foetal mortality

	No. of cases	No. showing inflammation	Percentage
Live born	23	6	26.0
Still born	10	7	70

Inflammation is more frequent in placentae of still-born infants.

Comments

Histologic evidence of inflammation has been found in 40.8 per cent of the placentas and appendages studied. Deciduitis was found in 72.3 per cent of the specimens examined. (Fig. 1). Severe deciduitis is commonly associated with inflammatory changes in the placenta, membranes or cord. The infiltration of the veins without the infiltration of the arteries was not uncommon. The surface of the umbilical cord was usually intact but sometimes necrosis of the amniotic epithelium was seen in association with the underlying leucocytic infiltration. Infiltration of the umbilical cord occurred less often than chorioamnionitis. The incidence of the inflammation in the maternal tissues was significantly higher in cases with severe funiculitis. Inflammation of the amnion and chorion may thus depend upon the magnitude of the inflammatory reaction in the decidua. The stimulus which evokes severe deciduitis also elicits foetal response.

In a carefully documented study of foetal anoxia, Walker (1954) showed a significant association of foetal hypoxia with meconium staining of the amniotic fluid. He emphasised that the oxygen supply and oxygen reserve of the foetus decreases very rapidly and occasionally, after the 40th week of gestation may reach fatal levels. If the association of hypoxia and passage of meconium and period of gestation beyond 40 weeks is valid then it may be concluded that the significant association of leucocytic infiltration of the placenta and appendages with the passage of meconium and postmaturity could be due to hypoxia.

There was a significant increase in the incidence of inflammation in the cases associated with premature rupture of the membranes, prematurity, postmaturity, meconium stained liquor, toxaemia, anaemia and stillbirths. The incidence of inflammation was not altered by the duration of labour. There was no correlation between the inflammatory change in the placenta and appendages and maternal morbidity and neonatal infections.

Summary

Inflammatory change in the placenta and appendage is not uncommon. Of 76 placentas studied, deciduitis was seen in 72.3 per cent, chorionitis in 40.8 per cent, amnionitis in 28.9 per cent, and funiculitis in 26.3 per cent. Leucocytic infiltration was often associated with premature rupture of the membranes, prematurity, toxaemia, meconium staining of the amniotic fluid, stillbirths and postmaturity.

Thus it may be concluded that multiple etiologic factors are involved in the inflammatory reaction in the placenta and its appendages.

References

1. Beckmann, S. and Zimmer, E.: Arch. Gynak., **145**: 194, 1931.
2. Benirschke, K.: Am. J. Obst & Gynec., **84**: 1595, 1962.
3. Benirshke, K. and Clifford, S. H.: J. Pediat., **54**: 11, 1959.
4. Blanc, W. A.: Clin. Obst. & Gynec., **2**: 705, 1959.
5. Bourne, G. L.: The Human Amnion and chorion, Chicago, 1962, Year Book Publishers, Inc. p. 224.
6. Dominguez, R., Segal, A. J. and O. Sullivan, J. A.: J.A.M.A., **173**: 346, 1960.
7. Emig, O. R., Napier, J. V. and Brazie, J. V.: Obst. & Gynec., **17**: 743, 1961.
8. Fujikura, J. and Benson, R. C.: Am. J. Obst. & Gynec., **89**: 225, 1964.
9. Jeffcoate, T. N. A.: The Human Amnion and Chorion, Chicago, 1962 Year Book Publishers, Inc. p. 224.
10. Kelsall, G. R. H., Barter, R. A. and Manessis, C.: J. Obst. & Gynec. Brit. Common., **74**: 401, 1967.
11. Kuckens, H.: Arch. Gynak., **167**: 564, 1938.
12. Maudsley, R. R., Brix, G. A., Hinton, N. A., Robertson, E. M., Bryans, A. M. and Haust, M. D.: Am. J. Obst. & Gynec., **95**: 648, 1966.
13. McIlwaine, H.: In Morison, J. E.: Foetal and Neonatal Pathology, London, 1952, Butterworth and Co., Ltd., p. 292.
14. Morison, J. E.: Foetal and Neonatal Pathology, London, 1952, Butterworth, p. 285.
15. Novak, E. R. and Donald Wood-Ruff: J. Gynecologic & Obstetric Pathology, ed. 4, Philadelphia, 1962, W. B. Saunders Co.
16. Siddall, R. S.: Am. J. Obst. & Gynec., **14**: 192, 1927.
17. Siddall, R. S.: Am. J. Obst. & Gynec., **15**: 828, 1928.
18. Walker, J.: J. Obst. & Gynec. Brit. Emp., **61**: 162, 1954.
19. Widholm, O., Mayer, B. and Numers, C. V.: Gynaecologia, **155**: 385, 1963.
20. Wilson, M. G. and Armstrong, D. H.: Am. J. Obst. & Gynec., **90**: 943, 1964.

See Figs. on Art Paper I-II-III