INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
1560–8530/2001/03–2–263–265
http://www.ijab.org

Continuing Education Article

Sub-Involution of Placental Sites (SIPS): Possible Predisposing Factors and Consequences on the Fertility of Bitch

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ABSTRACT

The third stage of parturition in the bitch consists mainly in the delivery of the placenta, a variable period of uterine rest and partial segmental involution of the uterus after delivery of the neonate. Retention of placental tissues at implantation sites results in the sub-involution of placental sites (SIPS). The etiology of SIPS is yet unclear, however, it is known that the trophoblasts do not regress or degenerate normally, they continue to invade deep into the glandular layer or even the myometrium, preventing normal involution. Factors responsible for prolonged or premature parturition may be predisposing to SIPS.

Key Words: Sub-involution; Placental sites; Bitch; Predisposing factors

INTRODUCTION

During embryonic life, the physiologic exchange processes such as respiration and nutrition require special arrangements that are provided for by the intimate connection between the parts of fetal membranes and the maternal endometrium by a process termed implantation. The resultant organ called the placenta, consist of a fetal and uterine part.

The placenta is continuously changing in size, shape and internal structure throughout gestation. After implantation, it grows with a rapid, although gradually decreasing rate, and may be subject to minor involution before term. There is also the progressive attenuation of the physical barrier between the maternal and fetal circulations. At parturition, the placenta separates from the endometrium and the uterine horns return to the non-pregnant dimensions after 4 to 5 weeks. Lightly pigmented cylindrical zones can be identified up to three months post partum which indicate the sites of previous placental attachment (Noakes, 1979; Bjorkman, 1981).

Subinvolution of placental sites (SIPS)

SIPS is a disorder that occurs in healthy bitches post whelping. It is characterized by a bright red (fresh) bloody discharge passing from the vulva. The discharge persists for several weeks or months (7 to 12 weeks) post partum. This condition occurs almost exclusively in bitches younger than three years of age following the first whelping (Al-Bassam *et al.,* 1981a, b; Olson *et al.,* 1984; Johnson, 1989).

Pathophysiology

The pathophysiology of the condition centers around retained placental tags of tissue (not whole placentas) at implantation sites. Fig. 1 shows the attachment of the placenta to the wall of the uterus (Tulpule, 1987). Normally, at parturition, the placenta separates from the endometrium through the spongy layer (Fig. 2) due to some

Fig. 1. Section through the placenta and wall of the uterus showing attachment. The placenta is seen on the right (from: Tulpule S.S: Atlas of Histology, A.B.U. press, zaria, 1987)

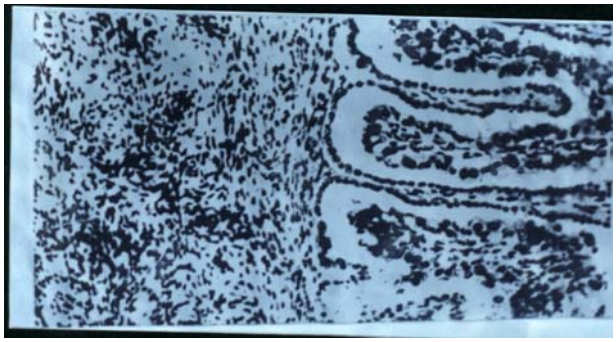


Fig. 2. Cross section of placenta girdle, bitch, near term. Note the myometrium (1), glandular zone (2), spongy zone (3), placental labyrinth (4), marginal hematomas (5), fetal vessels in mesenchyme (6). (from: Dellman, H.D and Brown, E.M: Textbook of Veterinary Histology, 2nd,ed Philadelphia, Lea & Febiger, 1981)

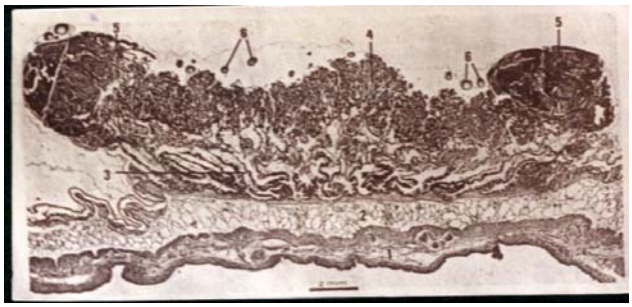
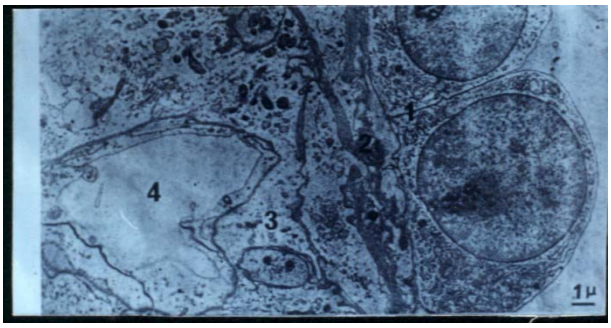


Fig. 3. Electron micrograph of placental labyrinth, late pregnancy. Note the maternal endothelium (1), basal lamina (2), syncytial trophoblast (3), fetal capillary (4). (From Dellman, H.D and Brown, E.M: Textbook of Veterinary Histology, 2nd, ed. Philadelphia, Lea & febiger, 1981)



degenerative changes in the endometrium (Priedkalns, 1981). The uterus continues to supply blood to these tissue tags (Olson *et al.,* 1984), resulting in the bloody discharges seen in SIPS. The cause of SIPS is not actually known. But what is known is that, the trophoblastic cells (Fig. 3) do not regress or degenerate normally, instead they continue to invade deep into the glandular layer or even into the myometrium (Fig. 2), preventing normal involution (Slatter, 1985). Also, there is a lack of evidence of thrombosis of endometrial vessels, failure of exposed placental blood vessels to Occlude and damage to uterine vessels. This results in the continued hemorrhage seen in SIPS. The reason for these failures is also not known, but factor precipitating degenerative changes in the endometrium (Local Ischemia) may be responsible.

Possible predisposing factors

In the discourse on dehiscence and retention of the placenta in cattle, clinical factors predisposing to retention were elucidated. It was reported that any form of premature parturition, uterine inertia, infection, mineral and vitamin deficiencies were incriminated as predisposing to retention of placenta in cattle (Fitzpatrick, DBR 1988/89).

In bitch, the 3rd stage of parturition consists mainly in the delivery of the placenta, a variable period of uterine rest and partial segmental involution of the uterus after delivery of the neonate. Retention of one or more placentas in the bitch may occur in association with mild uterine inertia. When the inertia is due to exhaustion, the membrane usually passes within the next 12 hours (Mosier, 1989). The likely conditions predisposing to SIPS in the bitch are outlined below:

1. Prolonged parturition
    - A. Obesity (fatique and poor muscle tone)
    - B. Ca-Zn deficiency (abnormal ration: Calcium↑, Zinc↓)
    - C. Subclinical hypoglycemia
    - D. Subclinical hypocalcemia (slow initiation of labour)
    - E. Dystocia
    - F. Uterine inertia (primary and secondary)
    - G. Uterine torsion
2. Premature parturition
    - A. Abortion (E. coil, Brucella cains)

Significance on fertility

Bitches with SIPS are generally said to be febrile, systematically healthy and require no treatment. Recovery was said to be spontaneous and fertility is not affected (Shall, 1971; Olson *et al.,* 1984; Johnson, 1989). However, the clinical course of bitches with evidence of SIPS was investigated for the late sequalae of the disease. Genital disorders in the form of ovarian malfunction (OM), fetal mortality (FM), abortion (A) and metritis-pyometra (M-P) occurred in 6 of 16 patients observed during and after the first consecutive heat after SIPS and 2 of 2 observed during and after the second consecutive heat after SIPS (Arbeiter & Dickie, 1993).

It was also reported that rarely, SIPS become secondarily infected and the bitch present with metritis. In a few cases also, blood loss may be so severe that immediate transfusion becomes inevitable. This indicates that the pathological consequences of SIPS are able to cause or promote other genital disorders with possible implications on the fertility of the bitch.

Diagnosis and treatment

The diagnosis of SIPS is made on the basis of historical and physical findings, cytologic findings and histopathological examinations generally; three criteria have been suggested (Al-Bassam *et al.,* 1981b). The presence of large masses of collagen haemorhage dilated endometrial gland after the 7th post partum or lack of evidence of massive slough of collagen by 12th week post partum is confirmatory of the disease (Al-Bassam *et al.,* 1981b).

Grossly, the placental sites are twice the normal size for the same time, post partum. Post partum uterine lumen contains serosanguinous fluid. Vaginal cytology differentiates SIPS from metritis and normal lochia. Erythrocytes are the predominant cell types since the cytologic appearance is that of heamorrhage.

The treatment may include Ovarian hysterectomy, however, hysterolaparatomy with curettage of selected sites can be done. Ergonovine 0.2 mg/15kg single dose intramuscularly could be administered (This is however not widely used in small animals). Blood transfusion could also administered.

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(Received 13 February 2001; Accepted 14 March 2001)