

Histology of ovine placenta during gestation periods

A. F. Majeed* M. S. Shalal*

T. R. Mohammed**

*College of Veterinary Medicine, Al-Anbar University

**College of Agriculture, Al-Anbar University

Abstract:

Placentomes were collected from 93 pregnant slaughtered Ewes at different gestation periods, from AL.Falluja slaughter house during the periods from 2, July 2009 to 30, December, 2010. Tissue specimens for microscopic examination were taken from the centers of the sampled placentomes. Immediately following collection, the samples were fixed in 10% buffered neutral formalin for 24 h. Tissue specimens were dehydrated in a graded series of alcohol, cleared by xylol and embedded in paraffin. Histologic sections were cut at 3-4 µm thickness, stained with hematoxylin and eosin (H&E) (6). The period of gestation was measured according to Richardson (7) with equation of $x = 2.1(Y+17)$ as x = gestation period in day and Y = the crown Rump.

Histologic examination during early pregnancy (30 – 40 d) showed a pronounced BNC with a number of nuclei within each cellular boundary in the uterine epithelium indicates that possible fusions are restricted. It is also there is an increase in blood vascularity. At 40 – 50 d of pregnancy, there was a further increase in caruncular vascularity by 2-fold characterized by increase capillary number and 2 to 3 – fold increase in capillary diameter. Endometrial gland hyperplasia showed during this period. Then placentomes showed growth in number and size until 80th day. It was shown that the BNCS of the trophoblast increase in size, in polarity and in the number of their cytoplasmic granules as pregnancy advanced.

التغيرات النسيجية لمشيمة الأغنام أثناء فترة الحمل

عبد الستار فرج مجيد* مهدي صالح شلال*
نائل رشيد محمد**

* كلية الطب البيطري، جامعة الانبار
** كلية الزراعة، جامعة الانبار

الخلاصة:

تم جمع المشايم من 93 نعجة حامل خلال مراحل مختلفة من الحمل، من مجزرة الفلوجة للفترة من 2 تموز 2009 إلى 30 كانون أول 2010. أخذت نماذج للفحص المجهرى من مركز المشايم. وبعد الجمع مباشرة ثبتت النماذج في 10% محلول داروي الفورمالين المتعادل لمدة 24 ساعة.

مررت النماذج النسيجية في سلسلة من تراكيز الكحول وروقت في الزايلول ثم غمرت في الشمع . قطعت النماذج نسيجيا بسمك 3 – 4 مايكروميتر ثم صبغت بالهيماتوكسولين ايوسين . حسبت فترة الحمل عن طريق معادلة (ريتشارد سن) $S=2.1(L+17)$ حيث S طول فترة الحمل بالايام و L الطول التاجي .

أظهر الفحص النسيجي خلال فترة الحمل المبكر (30-40) يوم وجود خلايا ثنائية النواة مع عدد من الانوية عند كل محيط خلوي في الطلاء الرحمي ، والذي يدل على ان الاتحاد محدد مع وجود زيادة في التجهيز الدموي . و خلال فترة 40-50 يوم من الحمل لوحظ وجود زيادة في التجهيز الدموي للحيمات الرحمية بمقدار ضعفين إلى ثلاثة اضعاف . كما لوحظ فرط تنسج في الغدد الرحمية و زيادة في نمو المشايم في العدد و الحجم إلى 80 يوم . لوحظت زيادة في الخلايا ثنائية النواة للتروفو بلاست في الحجم و القطبية والعدد في الحبيبات السايانو بلازمية كلما تقدم الحمل.

Introduction:

Ovine placenta is cotyledonary in structure and epitheliochorial histological type (1).The sheep is unusual in that the syncytium is formed by fully differentiated binucleate cells(BNC) whose granules contain arrange of secretary products (2, 3).The placentomes facilitates a variety of metabolic exchanges between the fetal and maternal blood streams in acting as the organ of fetal respiration ,nutrition and excretion,but it also impedes the transplacental movment of such diverse molecular species as the fat-soluble vitamins and some of the maternal hormones (4). In the ovine placenta these diverse functions are carried out by two types of trophoblast cell,a cuboid uninucleate cell and arounded BNC.As we shall demonstrate, both these cells undergo considerable structural modification during gestation (5). The aim of the study was undertaken to show the histological changes of ovine placentomes during different gestation periods .

Materials and Methods:

Placentomes were collected from 93 pregnant slaughtered Ewes at different gestation periods , from AL.Falluja slaughter house during the periods from 2, July 2009 to 30, December ,2010 . Tissue specimens for microscopic examination were taken from the centers of the sampled placentomes .Immediately following collection ,the samples were fixed in 10% buffered neutral formalin for 24 h .Tissue specimens were dehydrated in a graded series of alcohol , cleared by xylol and embded in paraffin .Histologic section were cut at 3-4 μ m thickness ,Stained with hematoxylin and eosin(H&E) (6).The period of gestation were measured according to Richardson (7) with aqutation of $x=2.1(Y+17)$ as x = gestation period in day and Y =the crown Rump.

Results and Discussion:

Histologic section of placentomes taken from Pregnant-genitalia at the gestation periods from 30-40 d showed a definitive synepithelio-chorial placental structure ,with pronounced BNC with anumber of

nuclei within each cellular boundary in the uterine epithelium indicates that possible fusions are restricted, it is also there is an increase in blood vascularity The ovine trophoblast is acuboidal epithelium containing

large BNCs resting on a well-defined basement membrane and interdigitating with maternal syncytium(Fig 1,2). Similar observations have been made by several workers(4,5,8,).

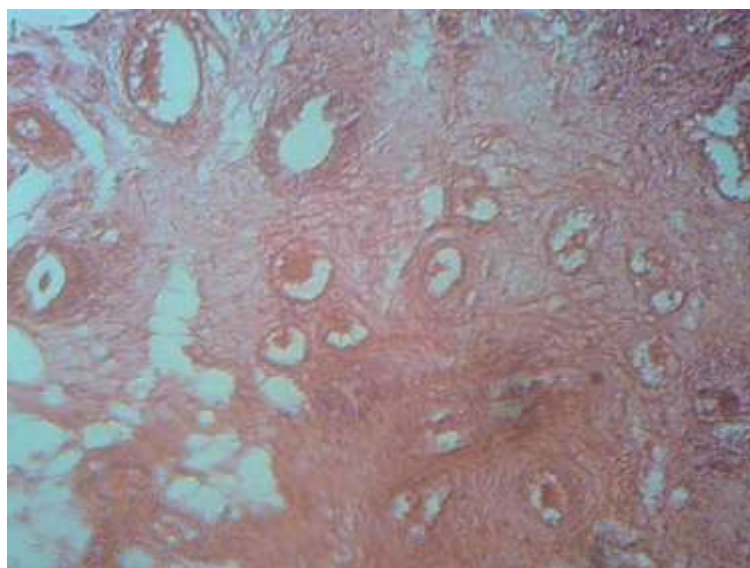


Fig : 1 There was acuboidal epithelium containing large BNCs resting on a well-defined basement membrane and interdigitating with maternal syncytium

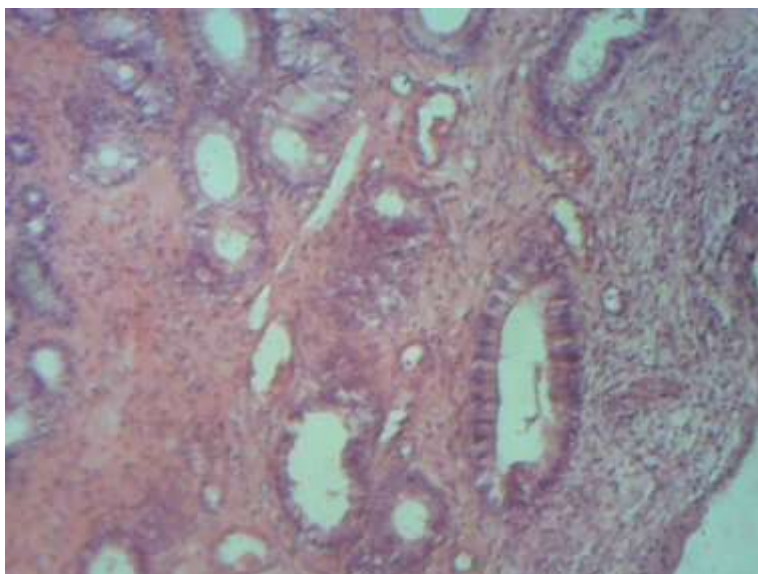


Fig: 2 There was acuboidal epithelium containing large BNCs resting on a well-defined basement membrane and interdigitating with maternal syncytium (Large magnification)

From 40 day to 50 d of pregnancy , there was a further increase in caruncular vascularity by 2-fold characterized By increase in capillary number and 2 to 3 –fold increases in capillary diameter (Fig 3,4). Endometrial gland hyperplasia showed during this peroid , furthermore ,migration and fusion of binucleate cell with maternal endometrial epithelial cells similar observations have been made by several authors(4,5,9,10).

The placentomes formed grow in number and size until the 80th day, it have shown that the ovine placentomes consist of chorionic villi fitting into maternal crypts separated from each other by septa.The chorionic villi consist of vascular mesenchymal cores provided with cuboidal trophoblastic cells and binucleate giant cells (Fig 5,6).Similar observations have been made by other workers (9,10). In

advanced placentomes (Fig7,8,9,10, 11,12,13,14,15,16);The consistent changes in the maternal side were vascular changes (Oedema , hyperemia and hemorrhages ,hemosiderin pigmentation and thickening of blood and lymph vessels in the connective tissue villi. was also seen . In the fetal side there were hyperplasia of the fetal villi and the presence of moderate to large numbers of binucleate cells .There was also a moderate infiltration of neutrophils in the connective tissue of the maternal side of the placentomes .similar observation have been shown by several workers(4, 8, 10, 11,)

It was shown that the binucleate cells of the placenta (trophoblast) increase in size , in polarity and in the number of their cytoplasmic granules as pregnancy advances (12).

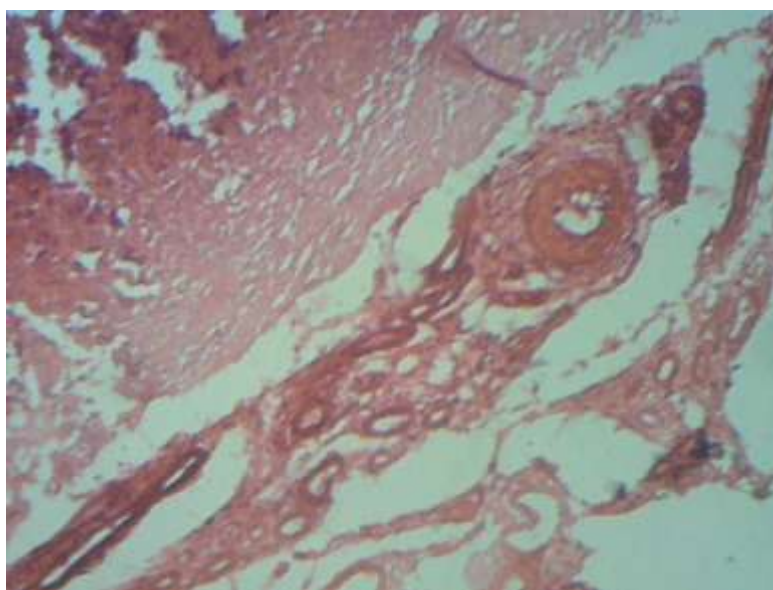
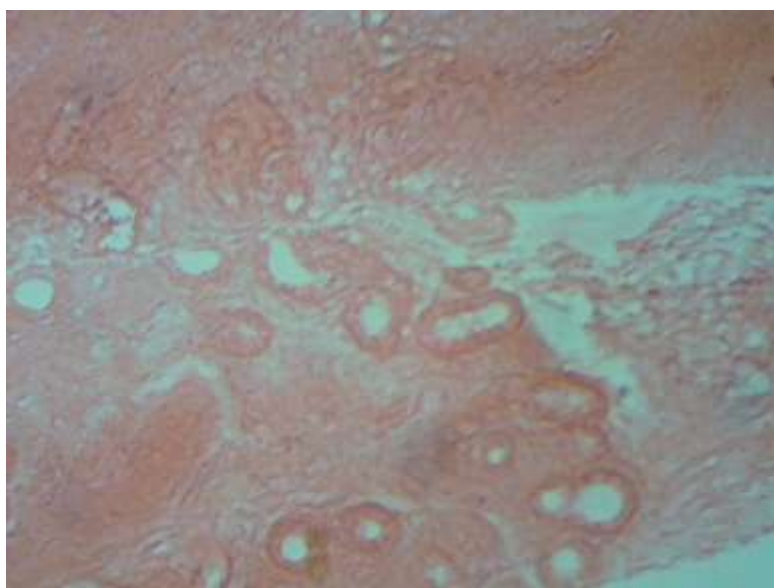
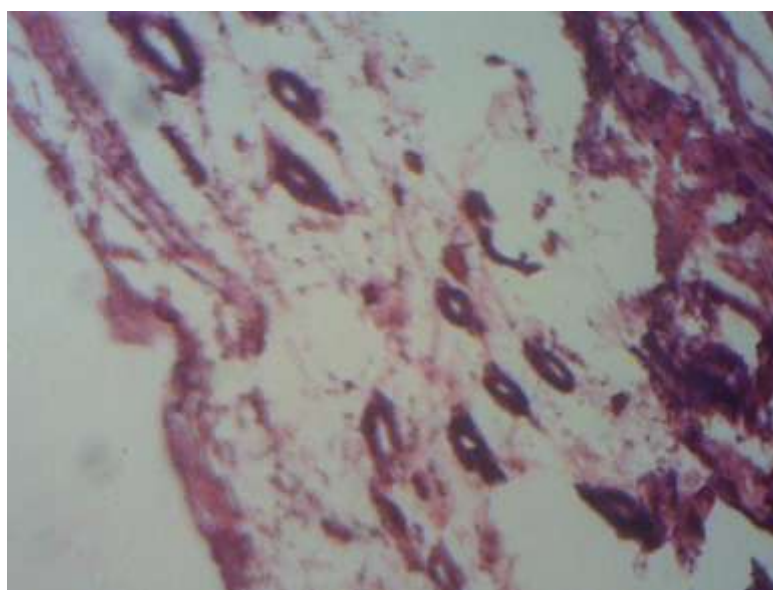


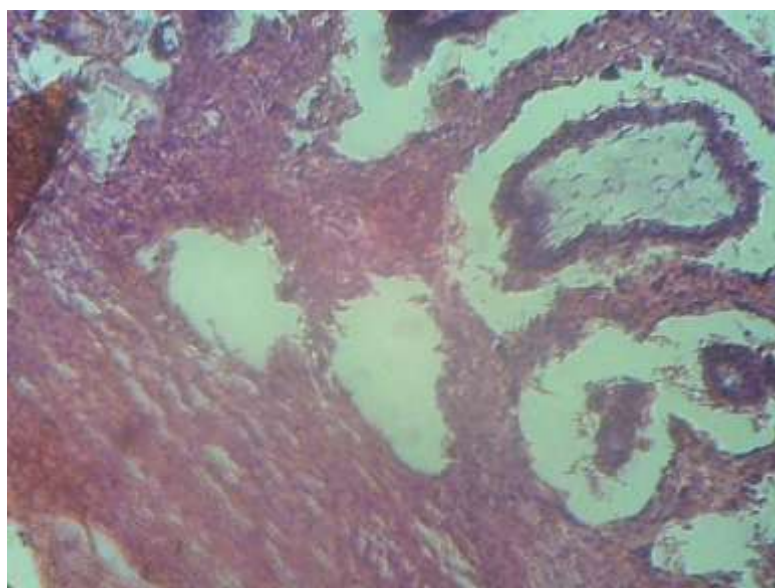
Fig: 3 On 40 day to 50 d of pregnancy , there was a further increase in caruncular vascularity by 2-fold characterized By increase in capillary number and 2 to 3 –fold increases in capillary diameter

**Fig: 4**

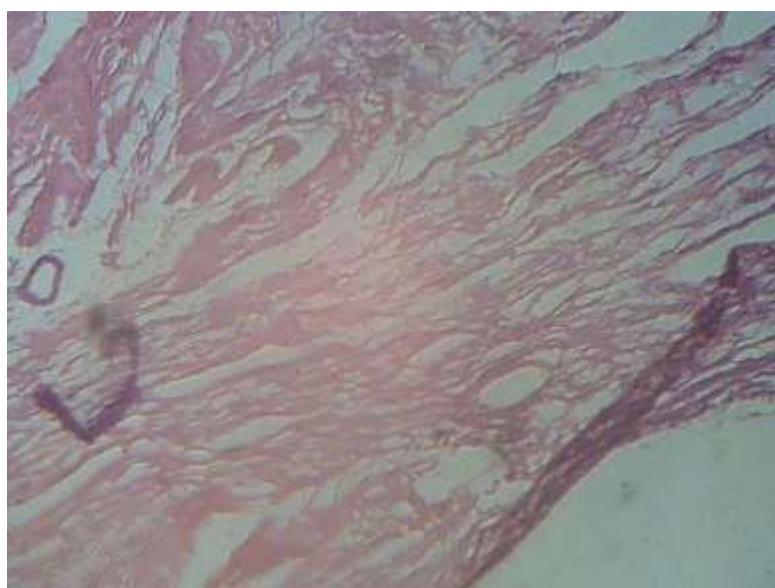
On 40 day to 50 d of pregnancy , there was a further increase in caruncular vascularity by 2-fold characterized By increase in capillary number and 2 to 3 – fold increases in capillary diameter (Large magnification)

**Fig: 5**

The chorionic villi consist of vascular mesenchymal cores provided with cuboidal trophoblastic cells and binucleate giant cells

**Fig: 6**

The chorionic villi consist of vascular mesenchymal cores provided with cuboidal trophoblastic cells and binucleate giant cells (Large magnification)

**Fig: 7**

The vascular changes in maternal side were Oedema , hyperemia and hemorrhages ,hemosiderin pigmentation and thickening of blood and lymph vessels in the connective tissue

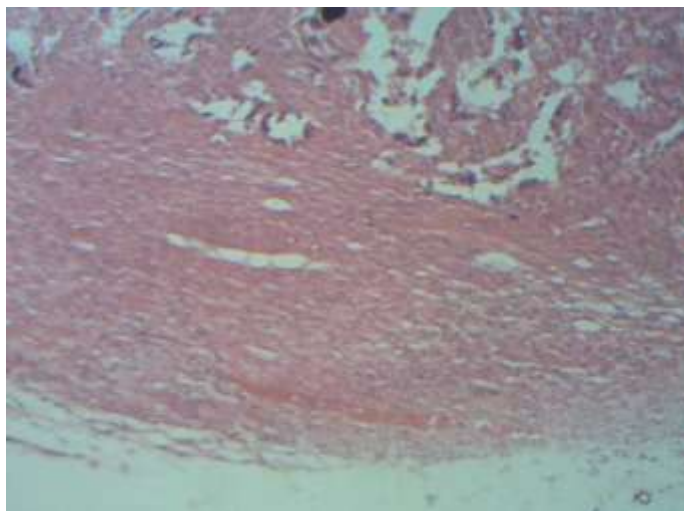


Fig: 8 Vascular changes with cellular infiltration

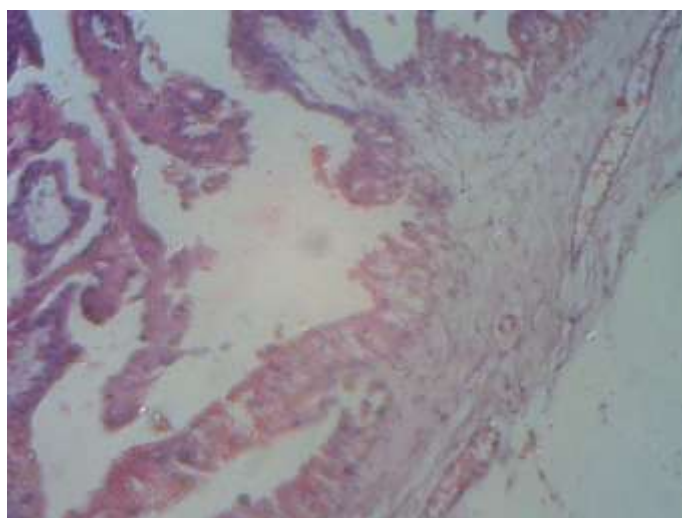


Fig: 9 epithelial hyperplasia



Fig: 10 endometrial gland hyperplasia with vascular changes

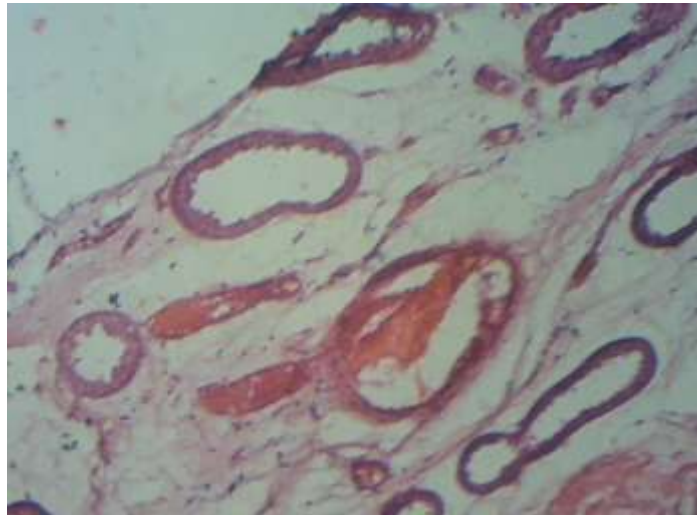


Fig: 11 capillary dilatation

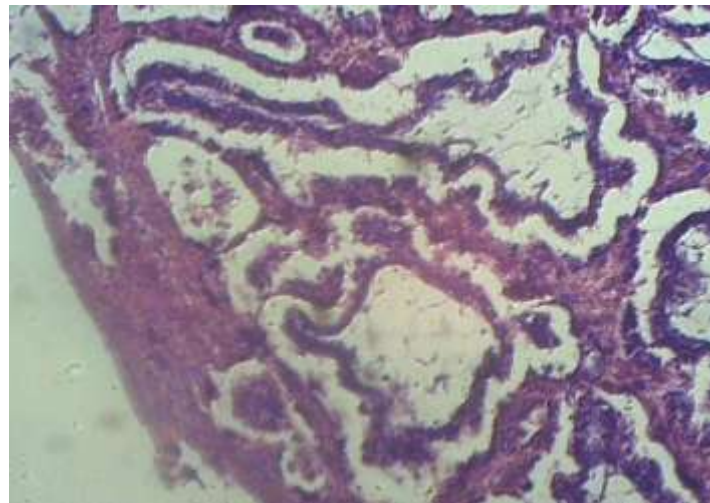


Fig: 12 dilatation of capillary in the syncytium

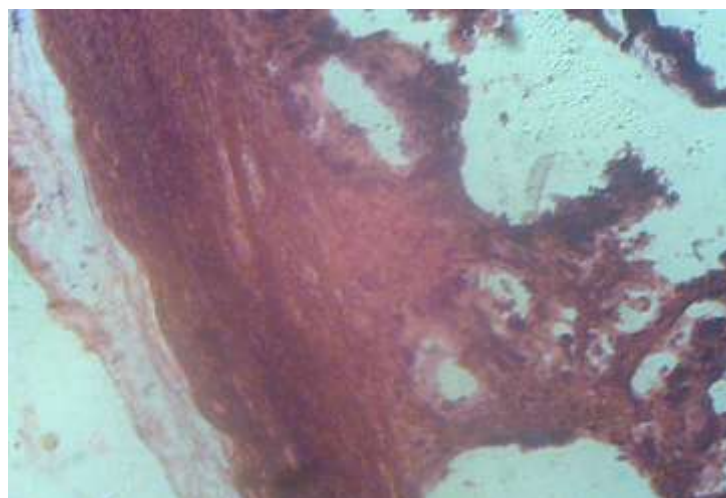


Fig: 13 fetal side hyperemia with mononuclear cell infiltration .

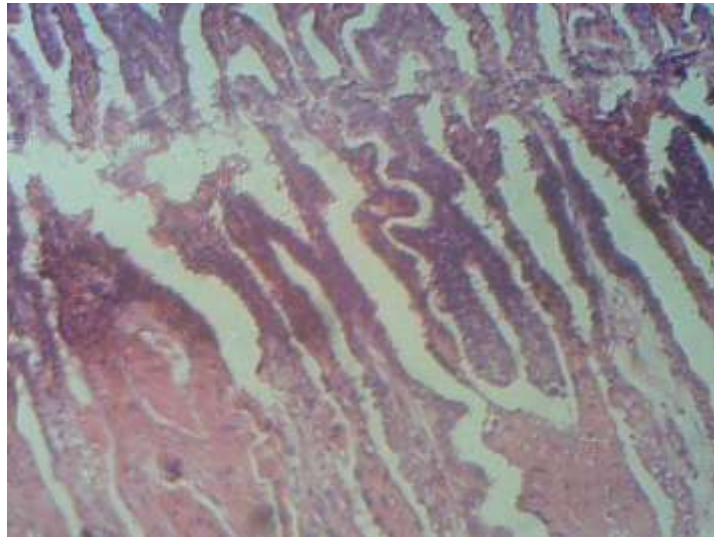


Fig: 14 dilatation of the endometrial gland with hyperplasia with BNC infiltration

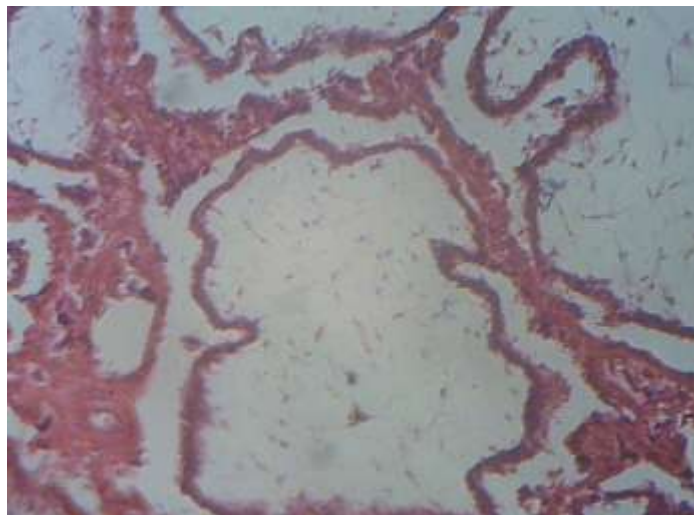


Fig: 15 fetal side with vascular changes with few BNC

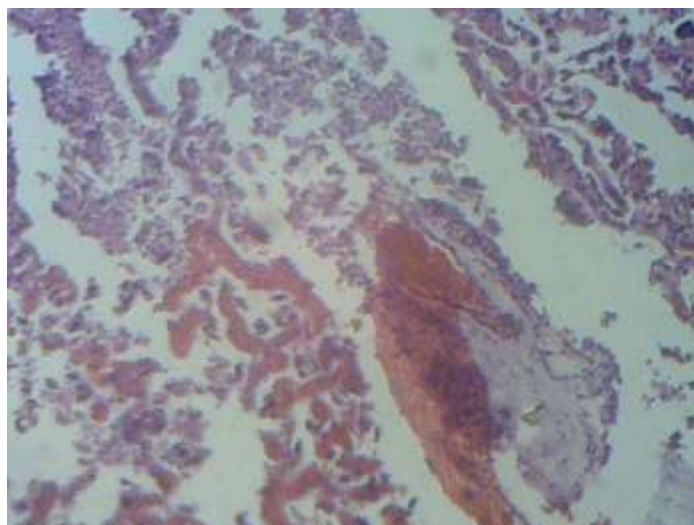


Fig: 16 BNCs infiltration in advance pregnancy

References:

- 1 – Steven ,D.H., 1975 .Comparative Placentation. Academic press, London, pp.62-66.
- 2–Martal, J. , Djiane,J.and Dubois, M.B.,1977.Immunoflorescent Localisation of ovine placental .cell and tissue Res;184:427-433 .
- 3–Wooding .B.P.,1981.Localisation of ovine placental lactogen in Sheep placentomes by electron microscope immunocyto-chemistry.J.Reprod .Fert .,62:15-19 .
- 4 – Boshirer ,D.P. and Holloway,H., 1977.The sheep trophoblast and Placental function :an ultrastructural study,J.Anat.,124 (2):287-298.
- 5 – Wooding,P.and Burton ,G.,2008. comparative placentation .Springer. Com.germany ,pp.133-167 .
- 6 – Culling,C.F.A. ,Allison ,R.T.and Barr,W.T.,1985. Cellular pathology Techniques . 4th edn.,Butterworths, London ,pp.155-163.
- 7 – Richardson, C.,1980.Pregnancy diagnosis in sheep . Br.vet.J.,136; 325-330.
- 8 – Perry,J.S., Heap,R.B. and Ackland ,N.,1975.The ultrastructure of the Sheep placenta around the time of parturition .J.Anat.,120:561-570.
- 9 – Bjorkman,N.,1965.Fine structure of the ovine placentome J.Anat ., 99,283-297.
- 10 – Igwebuike ,U.M., 2009.A review of uterine structural modificationsThat influence conceptus implantation and development in sheep and goats.Anim.Reprod.Sci.,112:1-7.
- 11 – Majeed.A..F.,AL-Sadi,H.I. and Ridha, A.M., 1995.Ovine placenta Releted to binucleated cells in fetal membrane retention .small Ram.Res.,17:
- 12 – Lawn,A.M.,Chiquoine ,A.D. and Amoroso ,E.C., 1969. The Development of placenta in the sheep and goat: an electrone Microscope study.J.Anat .,105,557-578.