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UMBILICAL ISSUES: ULTRASONOGRAPHY MAKES IT CLEAR!

Umbilical structures in foals

Foals with obvious changes of the external umbilicus, with depression, anorexia, pyrexia or other signs of sepsis (eg septic arthritis, pneumonia, septicaemia) should always have an ultrasonographic examination of umbilical structures as chronic infection and abscessation of these structures is a common reason for origin/persistent/recurrence of such septic problems in foals in the **first 4-6 weeks** of life. Surgical omphalectomy alongside specific treatment of the presenting signs significantly improves the long-term outcome of such cases.

Technically, the absence of fat, the fine hair coat, thin skin and superficial intrabdominal location of the umbilical structures enable good images to be obtained without necessarily having a highly-specialised ultrasound machine. A 7.5-10MHz linear “tendon scanner” will invariably provide good quality images although a 7.5-10 MHz sector transducer is preferred.

The **umbilical vein** runs cranially from the umbilicus on the midline ventral abdominal floor and merges into the liver. It is relatively easy to image in a transverse plane as a rounded (slightly flattened dorsoventrally) mid-echogenicity structure typically 5-8 mm in diameter (up to 10 mm) (see table 1). Its internal structure should be homogeneous and any evidence of hypoechoic or hyperechoic foci, especially if associated with enlargement (>10mm) of the structure, should be regarded with great suspicion for sepsis.

The paired **umbilical arteries** run caudally from the umbilicus to merge with the lateral walls of the bladder. The **urachus** is closely associated between the two arteries until it merges with the cranial aspect of the bladder. The urachus is a long tubular structure whose center has collapsed. It is scarcely delimited and presents as hypoechogenic tissue between the two arteries ⁽¹⁾. The urachus is more of a “potential hypoechoic space” between the umbilical arteries rather than a readily identifiable structure in

the normal foal. Each umbilical artery is typically a little larger than the umbilical vein - 6-10 mm diameter (up to 12mm) and the combined triple structure of 2 x umbilical arteries + urachus is typically 15-20 mm diameter (up to 25mm) ⁽²⁾ (see table 1). umbilical arteries normally have thicker and more echogenic walls than the umbilical vein and may look like “eyes” (*white circle with darker centre*). As for umbilical vein infection, infected umbilical arteries or urachus are seen as swelling and changes in echogenicity. Also, asymmetry in size of the umbilical arteries is suggestive of inflammation/infection.

The umbilical structures become progressively harder to identify beyond 4-6 weeks of age in normal foals.

An advantage of ultrasonography is the accurate representation of the extent of intra-abdominal changes and the ability to measure and assess them. In a study by REEF et al. of 59 abnormal findings of an umbilical infection, which were seen intraoperatively, 57 could already be identified by ultrasound ⁽³⁾.

Tab. 1: Mean diameter of the umbilical vessels in clinically healthy foals from the first day of life to the fourth week of life

Ø of intra-abdominal structures	Age of the foal		
	2-24 h p.p. (n = 31) ⁽⁴⁾	7 d p.p. (n = 31) ⁽⁴⁾	6 h - weeks p.p. (n = 13) ⁽¹⁾
Vein 1cm cranial to external umbilicus	8,3 ± 3,0mm	5,5 ± 1,5mm	6,1 ± 2,0mm
Urachus + arteries caudally to external umbilicus	17,7 ± 2,7mm	17,8 ± 2,6mm	17,5 ± 3,7mm
Each umbil. artery caudally to external umbilicus	7,8 ± 1,7mm	6,4 ± 1,5mm	8,5 ± 2,1mm

n: number, p.p.: post partum, h: hours, d: days, Ø = Diameter

References

- 1 Reef VB, C COLLATOS. Ultrasonography of umbilical structures in clinically normal foals. Am.J.Vet. Res.,1998;49:2143-2146
- 2 REEF V.B. Abnormalities of the neonatal umbilicus detected by diagnostic ultrasound. Proc.Annu.Meet Am.Assoc.Equ.Pract.,1986:157-162
- 3 REEF VB, C COLLATOS, PA SPENCER. Clinical, ultrasonographic and surgical findings in foals with umbilical remnant infections. J.Am.Vet.Med.Assoc.,1989;195:69-72
- 4 LAVAN RP, T CRAYCHEE, JE MADIGAN. Practical method of umbilical ultrasonographic examination of one-week old foals: the procedure and the interpretation of age-correlated size ranges of umbilical structures.J. Equine Vet. Sci.,1997;17:96-101