

ANATOMICAL CONSIDERATIONS FOR THE DEVELOPMENT OF ARTIFICIAL INSEMINATION BY CATHETER IN TWO MARSUPIALS

D.B.B.P. Paris¹, D.A. Taggart^{1,2}, G.A. Shimmin², M.B. Renfree¹, and M.C.J. Paris³

¹University of Melbourne, Vic., Australia, ²University of Adelaide, South Australia, Australia, ³Murdoch Children's Research Institute, Vic., Australia

We recently reported the birth of a tammar wallaby produced by intrauterine AI [Paris DBBP et al., Australian Mammal Society Conference, July 2002]. The use of AI has great potential for the conservation of rare and endangered marsupials, but a non-surgical method of insemination is needed if such a technique is to be widely adopted. In this study we compared the anatomy of the reproductive tract of two monovular marsupials: the tammar wallaby (*Macropus eugenii*, family Macropodidae) and southern hairy-nosed wombat (*Lasiorhinus latifrons*, family Vombatidae), in relation to the ability to deposit semen non-surgically by catheter. These species are ideal models for endangered marsupials such as the brush-tailed rock wallaby (*Petrogale penicillata*), long-nosed potoroo (*Potorous tridactylus*) and critically endangered northern hairy-nosed wombat (*Lasiorhinus krefftii*). As in all marsupials studied, tammars and wombats have two completely separate uteri each opening into the anterior vaginal culs de sac (AVC) through two distinct cervixes. The vaginal canals, unique and highly variable in marsupials, consist of two lateral vaginae (LV) and a third median vagina (MV) connecting the AVC to the urogenital sinus and opening. Adult female reproductive tracts were examined from 13 tammars and 5 wombats. A silicon balloon HSG catheter (5 French 30 cm; Cook, Australia) was introduced at the urogenital opening and navigated through the MV to the AVC, proximal to the cervixes. The balloon was inflated to seal off the posterior end of the MV. Two milliliter (tammar) or 1 ml (wombat) of 0.1% Coomassie brilliant blue (Sigma, Australia) was injected into the AVC to stain and simulate the site of insemination. The balloon was deflated, catheter retracted and the extent of dye distribution in the tracts noted. In the tammar, as in all macropodids, the MV is a single open canal, allowing both cervixes to draw semen. However, a septum divides the MV in wombats and interestingly, the MV was partially fused at the caudal end. In the tammar, Coomassie blue penetrated the MV, the AVC and cervixes. These lie a distance of 7.6 ± 0.3 cm from the urogenital opening (see table). In the wombat, the MV was fused caudally and so was difficult to penetrate. The cervixes lay 13.3 ± 0.3 cm from the urogenital opening. Coomassie blue was localized to only one side of the MV and AVC, confirming that the median septum effectively separates the cervixes.

These results have important implications for AI using non-surgical catheters for semen deposition. In the tammar wallaby and potentially other macropodids, cervical insemination via the MV is feasible, requiring no ultrasonic guidance. However in the southern hairy-nosed wombat and other vombatids, cervical insemination is unlikely to be successful due to the fused MV. Presence of the septum would require the side of ovulation and thus catheter delivery to be determined by ultrasound.

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Species	Catheter penetration				Median septum	MV, AVC and cervical staining
	UGS	LV	MV	Depth to cervixes ^a (cm)		
<i>M. eugenii</i>	Easy	None	Easy	7.6 ± 0.3	Absent	All
<i>L. latifrons</i>	Easy	None	Difficult	13.3 ± 0.3	Present	Right side only

UGS: urogenital sinus; LV: lateral vaginae; MV: median vagina; AVC: anterior vaginal culs de sac.

^a Mean \pm S.E.M.