



THE CLINICAL VALUE OF PELVIMETRY IN FEMALE DOGS

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Abstract The pelvis is an anatomically and functionally complex bone that contributes to locomotion and obstetrics. Pelvis anatomy is very important during parturition because it must be large enough to allow the passage of the foetus. Inability to deliver a foetus through the birth canal is called dystocia and is a common complication of parturition in animals. One of the causes of dystocia is the foetal-pelvic disproportion caused by a small, narrow pelvic canal and deep position of the pregnant uterus in combination with large foetal head and shoulders. The aim of this paper is to correlate existing information to improve the ability of researchers and clinicians to understand and interpret pelvimetric study results in different breed dogs and understand the importance of pelvis anatomy in parturition.

• Introduction

Pelvimetry is a valuable method used in evaluation of the pelvis size by measuring its capacity and diameters, being considered a useful technique for assessing the pelvic diameter in correlation to dystocia. Specific pelvic diameter measurements, such as the sacropubic or vertical diameter are used in order to assess the pelvic size and identify potential parturition complications.

External pelvimetry or indirect pelvimetry is performed by taking manual measurements outside of the animal or by using imaging modalities such as radiography, computer tomography or magnetic resonance imaging.

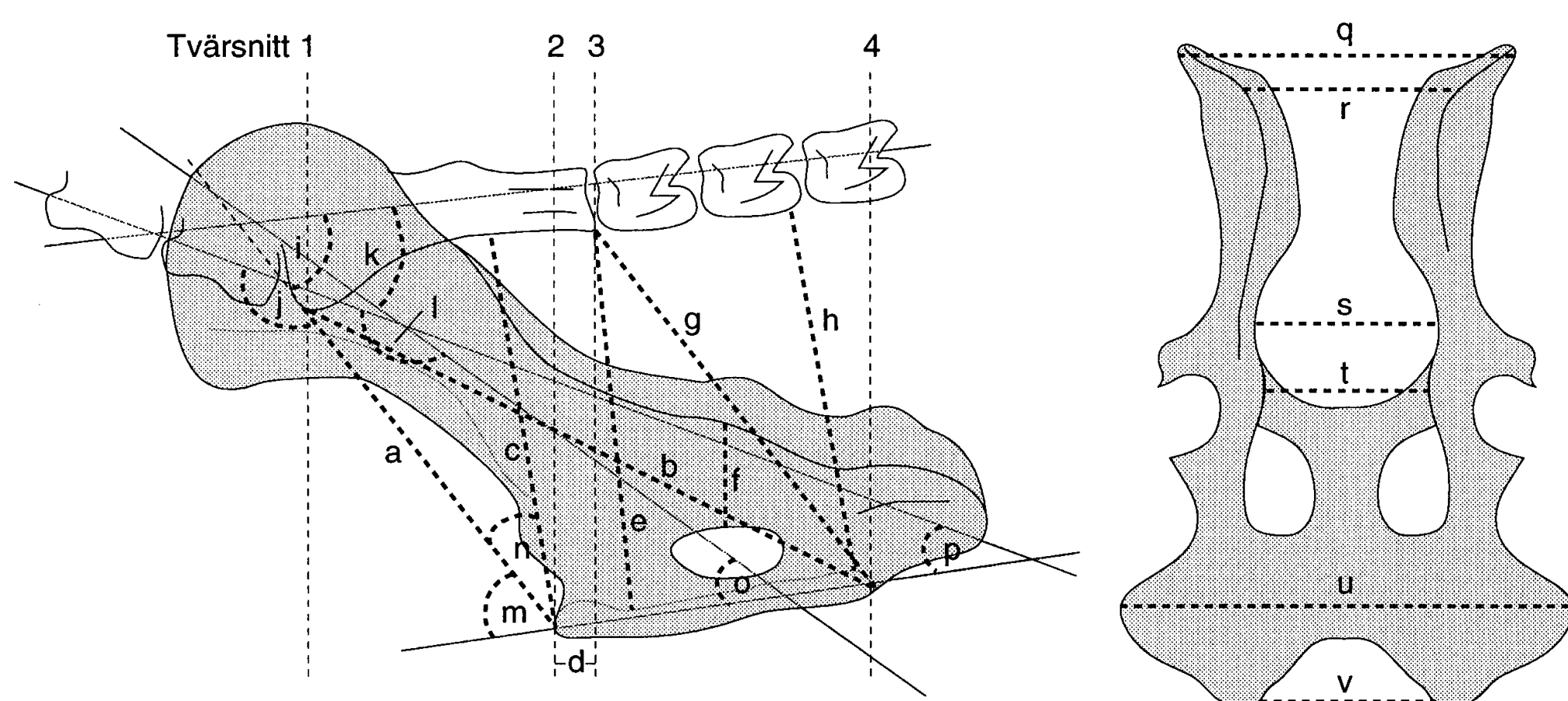


Fig. 2. Distances and angles between structures of the pelvis that were measured in bitches by radiographic pelvimetry [Eneroth et al., 1999]

Table 1. Pelvic measurements description by radiographic pelvimetry [Eneroth et al., 1999]

Nr. crt.	Diameter measured	Distances between structures of the pelvis measured	Letter Fig. 2
1	Sacropubic diameter (Conjugata vera)	Promontorium (cranial end of sacrum) to Pecten ossis pubis (cranial end of pubic symphysis)	(a)
2	Conjugata diagonalis	Distance between promontorium and caudal end of symphysis	(b)
3	Conjugata verticalis	Vertical distance between pecten ossis pubis and sacrum	(c)
4	Sacral diameter	Vertical distance between caudoventral extremity of sacrum and symphysis	(e)
5	Sagittal diameter	Distance between caudoventral extremity of sacrum and caudal end of symphysis	(g)
6	Angle (1)	Angle between sacrum and pelvic inlet	(i)
7	Angle (2)	Angle between sacrum and the shafts of ilium	(k)
8	Angle (3)	Angle between symphysis and pelvic inlet	(m)
9	Inclinatio pelvis	Angle between pelvic inlet and diameter verticalis	(n)
10	Angle (4)	Angle between symphysis and the shafts of ilium	(o)
11	Horizontal diameter (1)	Horizontal distance between the two tubera coxae	(q)
12	Diameter transversa	Horizontal distance between shafts of ilium	(s)
13	Horizontal diameter (2)	Horizontal distance between the two acetabuli	(t)
14	Horizontal diameter (3)	Horizontal distance between the two lateral tubera ischiadica	(u)
15	Horizontal diameter (4)	Distance between the two medial tubera ischiadica	(v)

• Results and discussions

Boston terrier breed has a tendency for a greater vertical diameter of the pelvic canal in whelping bitches compared to the ones experiencing difficulties in parturition, when pelvis is assessed by radiographic pelvimetry.

In **Scottish terrier** breed, a combinations of three parameters were used, that gave the best discriminatory results between the two groups of Scottish terrier bitches. The parameters used included the sagittal diameter of the pelvic outlet, the angle between the shaft of the ilium and the sacrum, and the relation between vertical and horizontal diameters of the pelvic canal. The results shown that the pelvic canal was significantly shorter in the group of bitches with dystocia.

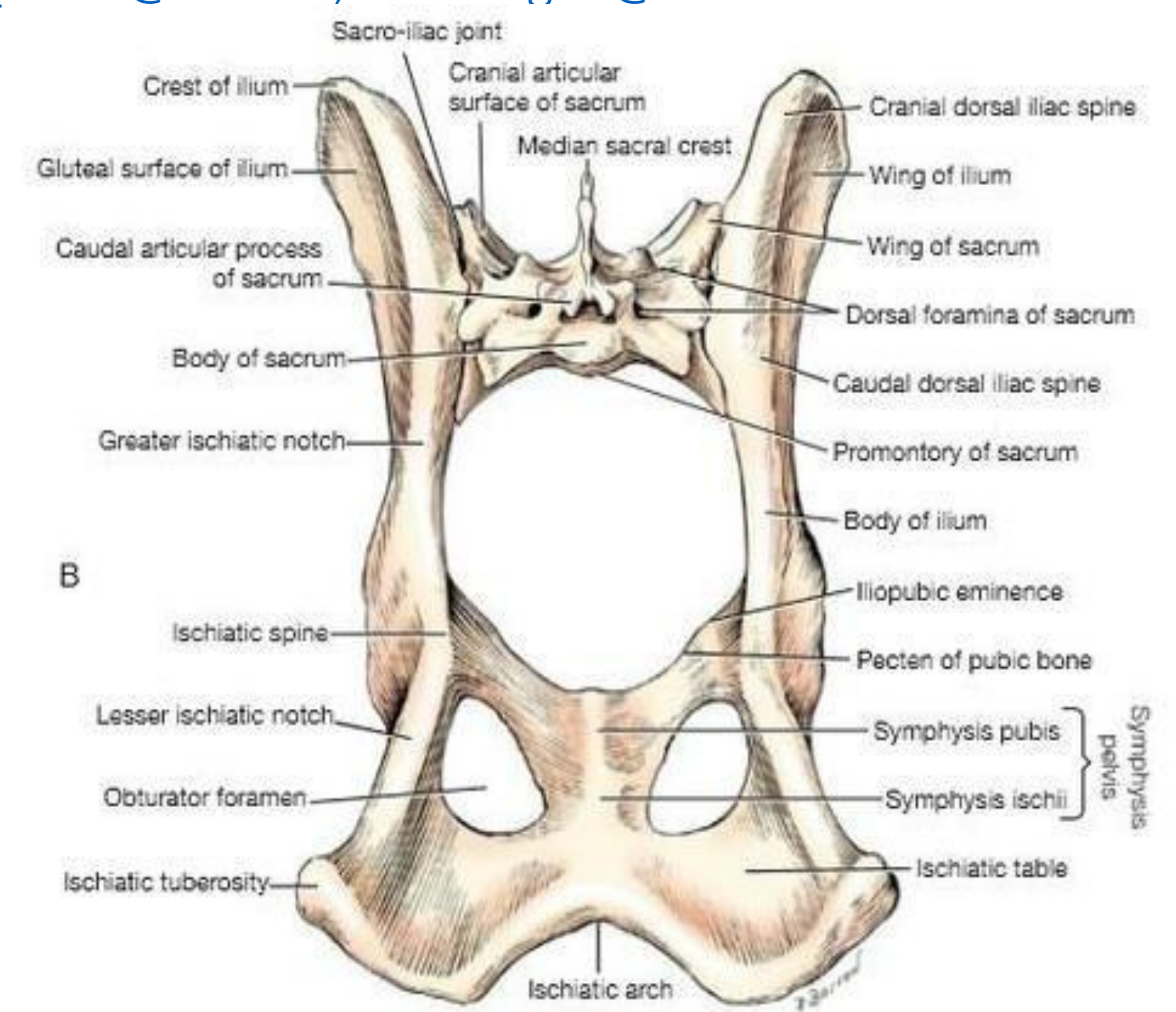


Fig. 1. Caudo-dorsal aspect of dog Pelvis [Hermanson et al., 2020]

In **French Bulldog** breed, there was a tendency for the bitches with dystocia to have a narrower pelvic canal as a result of transvers and horizontal diameter measurements, while there was no difference in the vertical diameter measurements of the pelvic canal.

There is no significant difference between the diameter of the pelvis in **English Bulldog** bitches with normal birth compared with bitches with dystocia, when pelvis is assessed by radiographic pelvimetry.

On pelvimetry by computer tomography when comparing **brachiocephalic** with **non-brachycephalic** breeds, the brachycephalic bitches had smaller pelvises, with a shorter conformation and narrower pelvic outlet than non-brachycephalic dogs.

Table 2. Pelvic measurements from radiographs of normally parturition bitches and bitches with obstructive dystocia [Eneroth et al., 1999, Horňáková et al., 2023]

Distance measured (cm)	Boston Terrier parturitia	Boston Terrier dystocia	Scottish Terrier parturitia	Scottish Terrier dystocia	English Bulldog parturitia	English Bulldog dystocia
Conjugata vera	4.5±0.05	4.4 ±0.11	4.5 ±0.06	4.3 ±0.07	6.50 ± 0.3	6.48 ± 0.3
Conjugata diagonalis	6.8 ± 0.08	6.8 ± 0.15	6.8 ± 0.07	6.5± 0.07	10.23 ± 0.4	10.15 ± 0.56
Diameter verticalis	4.4±0.06	4.1 ±0.16	4.6 ±0.08	4.3±0.07	6.32 ± 0.3	6.15 ± 0.3
Horizontal d. between the tubera coxae	7.1± 0.14	6.9 ± 0.17	7.8 ± 0.12	7.4 ± 0.12	-	-
Diameter transversa	4.3 ±0.08	4.2 ±0.10	4.3±0.06	4.3 ±0.04	5.05 ± 1.15	5.31 ± 0.21
Horizontal d. between the acetabuli	3.9 ± 0.09	3.8 ± 0.11	4.0 ± 0.08	4.1 ± 0.07	-	-

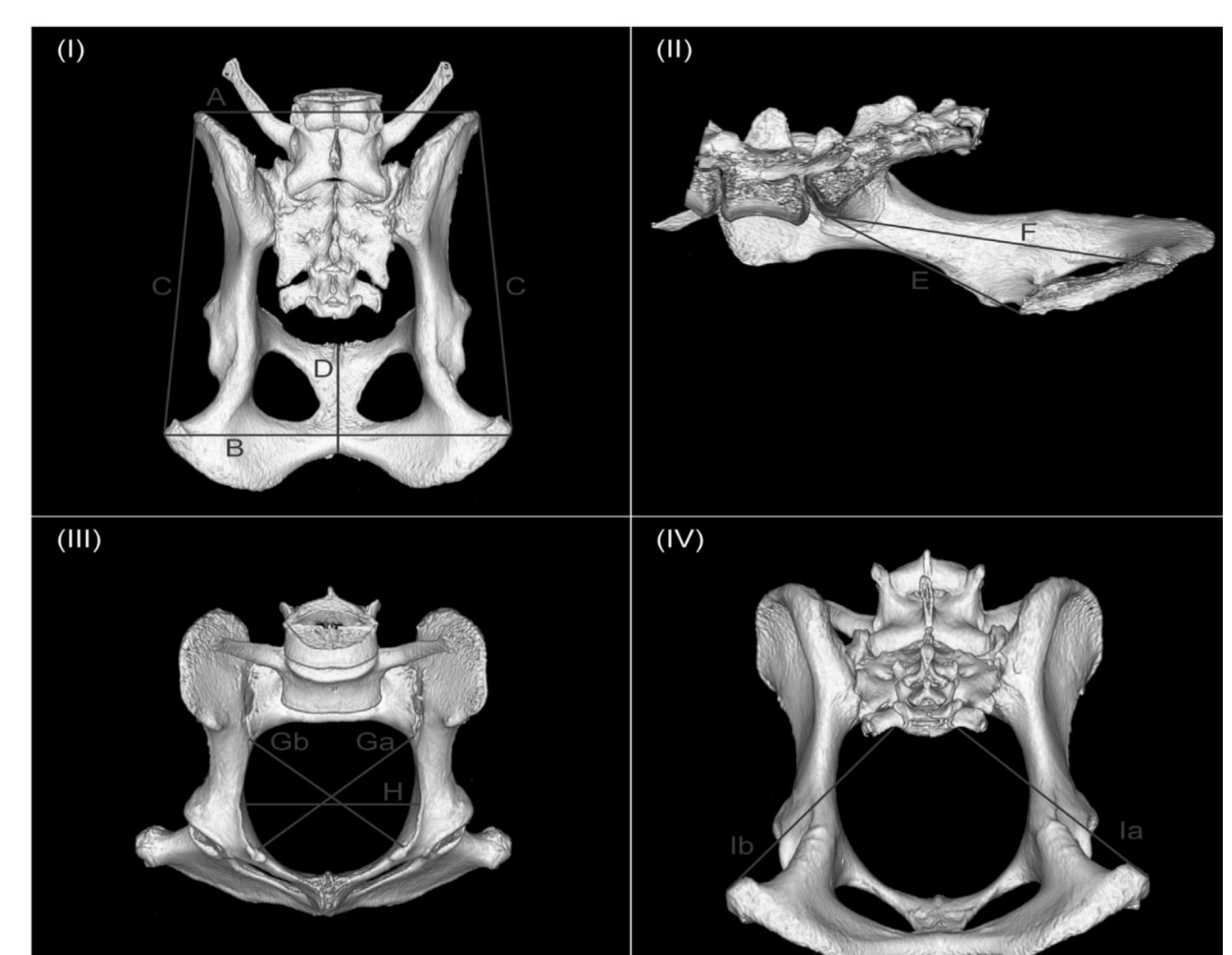


Fig. 3. Distances between structures of the pelvis that were measured in bitches by computer tomography pelvimetry [Dobak et al., 2018]

• Conclusions

Diagnostic imaging such as radiography and computed tomography are essential for management of dystocia in bitches.

Up until today there is important lack of data regarding pelvimetry in veterinary medicine and more specifically in bitch pelvimetry. There are no pelvimetry measurements available to date from breeds with a more natural body conformation on radiographic pelvimetry, and there is just one study on computer tomography pelvimetry, in order to define what is a normal pelvis.

It is also difficult to compare pelvises between breeds, since there is a great discrepancy between each breed body conformation.