

Table of contents

1. INTRODUCTION 1

2. LITERATURE 2

2.1. EPIDEMIOLOGY..... 2

2.1.1. Rupture incidence..... 2

2.1.2. Incidence according to breed..... 3

2.1.3. Incidence according to age..... 5

2.1.4. Incidence according to sex 5

2.1.5. Body-weight 6

2.2. DIAGNOSIS..... 6

2.2.1. Clinical symptoms 6

2.2.2. Palpation 6

2.2.3. Clinical instability tests..... 7

Anterior drawer test..... 7

Tibial- compression- test (Henderson and Milton 1978)..... 7

2.2.4. Partial CrCL rupture..... 7

2.2.5. Radiography 8

2.2.6. Ultrasound scans 8

2.2.7. Computed tomography (CT) 9

2.2.8. Magnetic resonance imaging (MRI) 9

2.2.9. Synopsis..... 9

2.2.10. Arthrotomy – Arthroscopy..... 10

2.3. ANATOMY..... 11

2.3.1. Cranial cruciate ligament - middle third 17

2.4. A SHORT HISTORY OF CRANIAL (ANTERIOR) CRUCIATE LIGAMENT
RUPTURE IN HUMANS AND DOGS..... 18

2.5. THERAPY..... 22

2.5.1. Conservative therapy..... 22

2.5.2. Surgical treatment 22

2.5.2.1. Intra-articular substitution of the CrCL 22

Table of contents

2.5.2.2. Extra-articular stabilization methods	25
2.5.2.3. Alloplastic CrCL replacements	27
2.5.2.4. Allogenic CrCL transplants in dogs	27
2.5.2.5. Dynamic osteotomy techniques: CTWO, TPLO TTA, TTO, MMP	28
2.5.2.6. Synopsis	30
2.6. BIOMECHANICS OF THE CAPSULO-LIGAMENTOUS APPARATUS IN	
THE STIFLE JOINT OF DOGS	31
2.6.1. Osseous stabilization.....	31
2.6.2. Ligamentous stabilization.....	32
2.6.2.1. The crossing four-bar linkage joint system.....	32
2.6.2.2. The main ligaments of the stifle joint.....	32
2.6.3. Cranial cruciate ligament.....	33
2.6.4. Muscular guidance of the knee joint.....	33
3. MATERIALS AND METHODS.....	35
3.1. CRUCIATE LIGAMENT HARVEST AND STORAGE.....	35
3.2. PREPARATION OF THE CANINE CrCL.....	37
3.3. BIOMECHANICAL TEST OF CANINE CrCL.....	40
3.4. HARVEST AND STORAGE OF CANINE AND EQUINE TENDONS.....	42
3.5. PREPARATION OF NATIVE, DECELLULARISED AND RECELLULARISED	
TENDONS.....	44
3.6. BIOMECHANICAL TEST OF CANINE AND EQUINE TENDONS	47
3.7. STATISTICAL ANALYSIS.....	49
4. RESULTS.....	50
4.1. ANATOMICAL VARIATIONS OF THE CANINE CrCL.....	50
4.2. BIOMECHANICAL PROPERTIES OF CANINE CrCL.....	52
4.3. ANATOMICAL VARIATIONS OF THE CANINE AND EQUINE TENDONS.....	57
4.4. BIOMECHANICAL PROPERTIES OF NATIVE TENDONS	57
4.5. BIOMECHANICAL PROPERTIES OF CCCT, CRCET AND EDDFT SAMPLES.....	59
4.6. NUMBERS OF SEEDED MSC CELLS OF RECELLULARIZED TENDONS.....	61

Table of contents

4.7.	COMPARISON OF CANINE CRANIAL CRUCIATE LIGAMENT TO CANINE AND EQUINE TENDON SAMPLES.....	63
5.	DISCUSSION	65
	<i>Anatomical variations</i>	67
	<i>Biomechanical properties of canine CrCL</i>	68
5.1.	CANINE CrCL PROSTHESES.....	69
5.1.1.	Anatomical variation of the canine and equine tendons prostheses.....	69
5.1.2.	Comparison of biomechanical properties of native and prepared tendons.....	70
5.1.3.	Decellularization and recellularization procedures.....	71
5.1.4.	Comparison of CrCL to allografts and xenografts.....	72
5.1.5.	Limitation.....	73
6.	SUMMARY	74
7.	ZUSAMMENFASSUNG	75
8.	REFERENCES	77
9.	APPENDIX	141
10.	ACKNOWLEDGEMENTS	149
11.	DECLARATION OF AUTHORSHIP	150