RCVS KNOWLEDGE

RCVS KNOWLEDGE CANINE CRUCIATE REGISTRY REPORT 2024

RCVS Knowledge is an independent charity sitting at the heart of the veterinary professions with a mission to advance the quality of care for the benefit of animals, the public and society.

To meet its goals, it supports and collaborates with veterinary teams on the ground and in practice. Influences policy. Engages with educators and other organisations.

It translates and disseminates the latest research from across the globe. Fosters approaches to shared learning with training and tools. Logs and tracks the evolving professions, underpinned by the veterinary archive.

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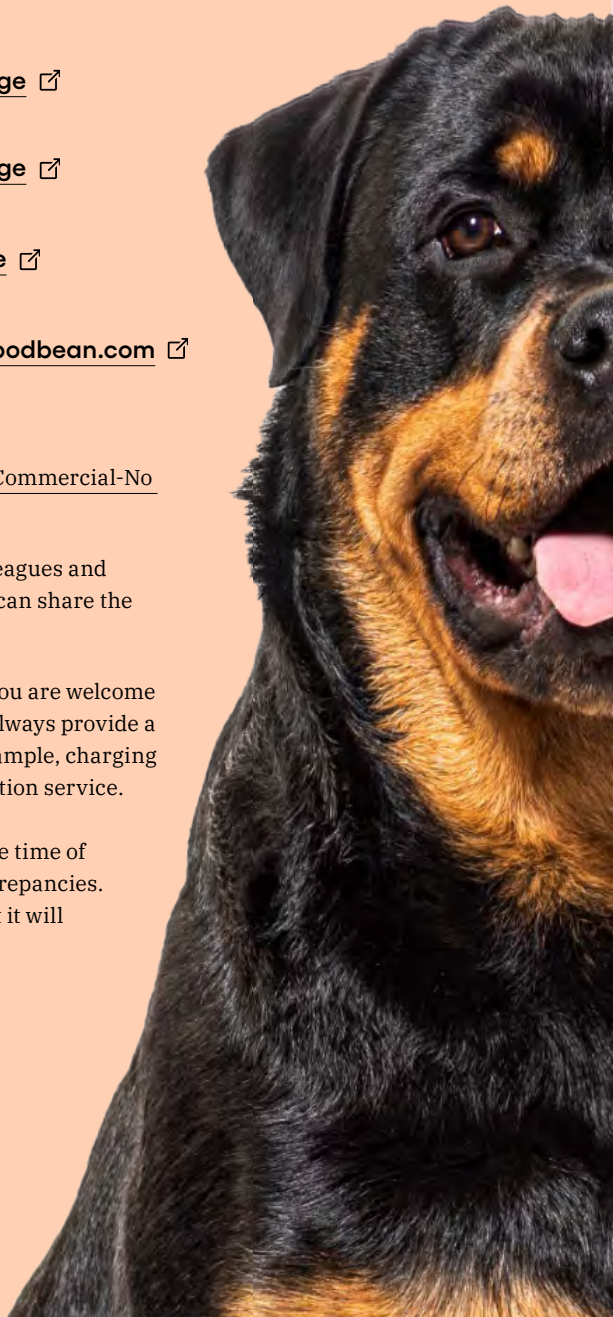

This report uses data from 28 July 2021 to 31 July 2024.

You can reference this report like this:
RCVS Knowledge (2024) *Canine Cruciate Registry Report 2024*. [Online]
Available at: ccr.rcvsknowledge.org/annual-report

ISBN - 978-0-902183-49-0

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A MESSAGE FROM THE CHAIR OF OUR BOARD OF TRUSTEES

The first thing I have to say is thank you. Thank you to every single one of the veterinary professionals, their teams, and their clients who contributed data to this report. Thanks to your diligence and generosity, we've almost doubled the amount of data submitted to the RCVS Knowledge Canine Cruciate Registry (CCR) since the last report was published in 2023 (a 79% increase, to be exact). Whether you submitted one case or many, you are part of a project that aims to change outcomes in canine cruciate surgery for the better.

When we released the first CCR report in 2023, we couldn't have anticipated the amount of interest it would generate in the veterinary world. Its reach has been impressive; we've had inquiries from across the globe expressing interest in the Registry, and RCVS Knowledge Clinical Lead Mark Morton has been invited to speak at conferences around the world about the data. It's heartening to see that this project we are all so passionate about is striking a chord with veterinary surgeons in a way that transcends national borders.

When we launched the CCR in 2021, our primary aim was to gather evidence on cruciate surgeries to provide veterinary professionals with the evidence they need to make informed care decisions in collaboration with clients. To achieve that goal, we needed the professions, and owners, to work together and share their data. The increase in cases we've seen submitted this year suggests that many vets and owners across the UK have done just that, not just once but continuously over a period of years. This just goes to show that there's a real appetite among the veterinary professions for actively contributing towards clinical registries for the improvement of clinical outcomes.

The sheer number of cases logged in the last 12 months provides a fantastic springboard for us to grow the CCR over the coming years. Last year's report drove a flurry of renewed attention in the CCR, from veterinary professionals who contribute regularly, to those who had never heard of it before, and plenty in between. I hope that the release of this report will lead to a similar increase in attention, and help us find new people who want to participate in growing the evidence base.

So, if you're reading this and feeling inspired to get involved, we'd love to have your help. If you're a veterinary surgeon who performs cruciate surgeries, we'd encourage you to sign up and start logging your cases to add to the data set. If you work in the veterinary sector but don't perform these surgeries, you can still participate! Speak to any surgeons you work with about logging their clinical outcomes on the CCR, and if they agree to do so you can log the data on their behalf. And if you're a pet owner, speak to your vet about getting involved and let them know you're happy to have your dog's data logged on the CCR.

I hope that many more of you will submit your data over the coming year and contribute to making a real difference to clinical outcomes for dogs in the future.

Amanda Boag
Chair of our Board of Trustees

A MESSAGE FROM OUR CLINICAL LEAD

Thank you for taking time to read the 2nd Annual Report of the RCVS Knowledge Canine Cruciate Registry (CCR). The Registry aims to improve the outcomes of canine patients undergoing cruciate surgery, whilst minimising complications.

It has been a challenging 12 months for the veterinary professions in the UK, with some uncertainty whilst we await the conclusions of the ongoing Competition and Markets Authority review. One area that features prominently in the consultation is 'quality' of care. Measuring quality in veterinary care is not easy; it means different things to different people. The veterinary sector does not have the resources of the NHS, and as veterinary professionals we do not have access to the size or quality of evidence available to clinicians working in human health care.

Though it may be difficult to measure quality, it is certainly not impossible, and assessing patient outcomes is one way we can do this. Of course, we all do this to some degree on a daily basis, but by working together and sharing this information, we can build a really powerful evidence base. The CCR has fast become a leading tool in outcome assessment, and we hope to continue to demonstrate what can be done and how we can involve owners in this process. Whether we, as a profession, are mandated to do more in this area remains to be seen, but evaluating what we do and how we can improve can only be a positive thing for our patients.

The CCR is open to all veterinary surgeons in the UK, performing any cruciate technique. Whilst the data set continues to grow rapidly, the vast majority of procedures are osteotomies. Whilst this may (or may not) be a reflection of the caseload across the UK, there is a noticeable lack of data from extracapsular procedures. The current discussions around contextualised care highlight how important it is that we have data from all treatment options for any given condition, as knowing the benefits of one procedure when compared to another is vital to decision making. In veterinary orthopaedics we are lucky to have this resource available to us. Please help this project grow by enrolling and continuing to submit cases, whatever procedure you perform, no matter how frequently you perform them.

We're grateful to the team at Amplitude Clinical Outcomes who manage the Registry platform on a day-to-day basis, particularly Rhiannon Hornett (Amplitude Clinical Outcomes) for helping to analyse and interpret the data.

I would like to personally thank the team at RCVS Knowledge who have helped produce this report and who continue to help drive this project forward. The support of RCVS Knowledge is vital to the success of the CCR.

A final thanks to all the dog owners who have contributed and continue to contribute data to this project. The Registry would not be able to function without your involvement and your support is helping to improve the outcomes of all patients undergoing cruciate surgery in the future, as well as helping owners make decisions around treatment.

Mark Morton
Clinical Lead

STEERING GROUP MEMBERS

The RCVS Knowledge Canine Cruciate Registry Steering Group has been developed to represent a broad spectrum of the veterinary profession.

It comprises two specialists in small animal orthopaedics, two experienced GP vets, an epidemiologist, a lay member, representation from the RCVS Knowledge Quality Improvement Advisory Board and members from the British Veterinary Orthopaedic Association (BVOA), who are endorsing the project.

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RCVS KNOWLEDGE CANINE CRUCIATE REGISTRY BACKGROUND

The RCVS Knowledge Canine Cruciate Registry (CCR) launched in July 2021 with the aim of improving canine cruciate patient outcomes and minimising complications, by supporting clinicians to evaluate which surgical techniques and implants are most effective and advance their quality of care.

The CCR is open to any veterinary surgeon in the UK performing any cruciate surgery technique. Outcomes are owner assessed using the Liverpool Osteoarthritis in Dogs (LOAD) [1] questionnaire and the Canine Orthopaedic Index (COI) [2].

The CCR is endorsed by the British Veterinary Orthopaedic Association (BVOA).

Surgeons can use the registry to monitor their own patients and can use the inbuilt reporting tools for personal clinical audit. Cases from across the registry are analysed centrally to produce annual reports. Data collected up to the end of July 2024 is included in this report.

GLOSSARY

A

Arthroscopy: Examination inside a joint using a small camera.

Arthrotomy: Incision into a joint to allow examination.

C

CBLO: CORA (Centre of Rotation of Angulation) Based Levelling Osteotomy.

CCR: RCVS Knowledge Canine Cruciate Registry.

CCWO: Cranial Closing Wedge Osteotomy.

COI: Canine Orthopaedic Index questionnaire.

CREM: Client Reported Experience Measure.

CROM: Client Reported Outcome Measure.

D

Delegates: Users of the registry that are linked with a registered user. This is often veterinary nurses or non-clinical team members that can access and input data on the registry on behalf of the veterinary surgeon. A veterinary surgeon can also act as a delegate for another veterinary surgeon.

E

ELSS: Extracapsular Lateral Suture Stabilisation, also known as a 'lateral suture'.

L

LOAD: Liverpool Osteoarthritis in Dogs questionnaire.

M

Meniscus: A cartilage shock absorber inside the knee.

Meniscectomy: Removing part of the meniscus, usually because it is damaged.

MMP: Modified Maquet Procedure.

O

Osteotomy: A cut made in a bone.

P

Pathways: A pathway is equivalent to a cruciate rupture on the Canine Cruciate Registry. Patients can have two pathways to indicate two cruciate ruptures (one of each stifle).

Pathway owners: The veterinary surgeon that has opened the pathway for the patient.

Registered users: Veterinary surgeons who have registered for an account on the Canine Cruciate Registry.

S

Stifle: Canine equivalent of the knee joint.

T

TPLO: Tibial Plateau Levelling Osteotomy.

TTA: Tibial Tuberosity Advancement.

For more information about these terminologies, or cruciate ligament rupture and common surgical procedures visit caninecruciateregistry.org.

REPORT SUMMARY

- There were 474 registered users (surgeons and delegates combined).
- There were 1319 surgical procedures logged.
- Compared to the 2023 report Staffordshire Bull Terriers are no longer one of the top five most common breeds in the registry, with Cockapoos jumping from seventh most common, to fourth.
- The majority of procedures performed were osteotomies, with the proportion that were TPLOs having increased since the 2023 report.
- Regional anaesthesia was used in 82.6% of patients, with a femoral and sciatic block most commonly performed.
- Patient weights ranged from 1.6kg to 80.3kg.
- Most patients (97.5%) had an intra--articular assessment, most commonly an arthrotomy.
- Peri-operative antibiotics were used in 99.9% of surgical procedures.
- Nearly two-thirds (63.9%) of patients did not receive post-operative antibiotics.
- A third of patients had a concurrent medial meniscal tear.

116 different dog breeds (or recognised variations) were reported

1. USER PROFILES

1.1 Users
There were 474 registered users of the CCR. There were 369 surgeons enrolled with 138 pathway owners (i.e. have contributed cases). There were 105 delegates.

1.2 Professional Designation
56.5% of pathways were registered to Advanced Practitioners (n=987). 14.8% were registered to RCVS Recognised Specialists (n=259). Pathways with procedures were distributed in a similar way.

1.3 Experience
Using years since graduation as a measure of experience, the mean years of experience of pathways owners was 20.7 years (median 21 years) with a range of 1-41.
* This date was calculated using the 'Activity Date' (either the date of the procedure or the date of pathway registration).

2. PATIENT NUMBERS

Since launch, 1746 pathways and 1319 surgical procedures have been logged.

3. PATIENT DEMOGRAPHICS

3.1 Sex and Neutered Status

Sex was reported in all pathways. Neutered status was unknown in 3% of pathways (**Figure 1** and **Table 1**).

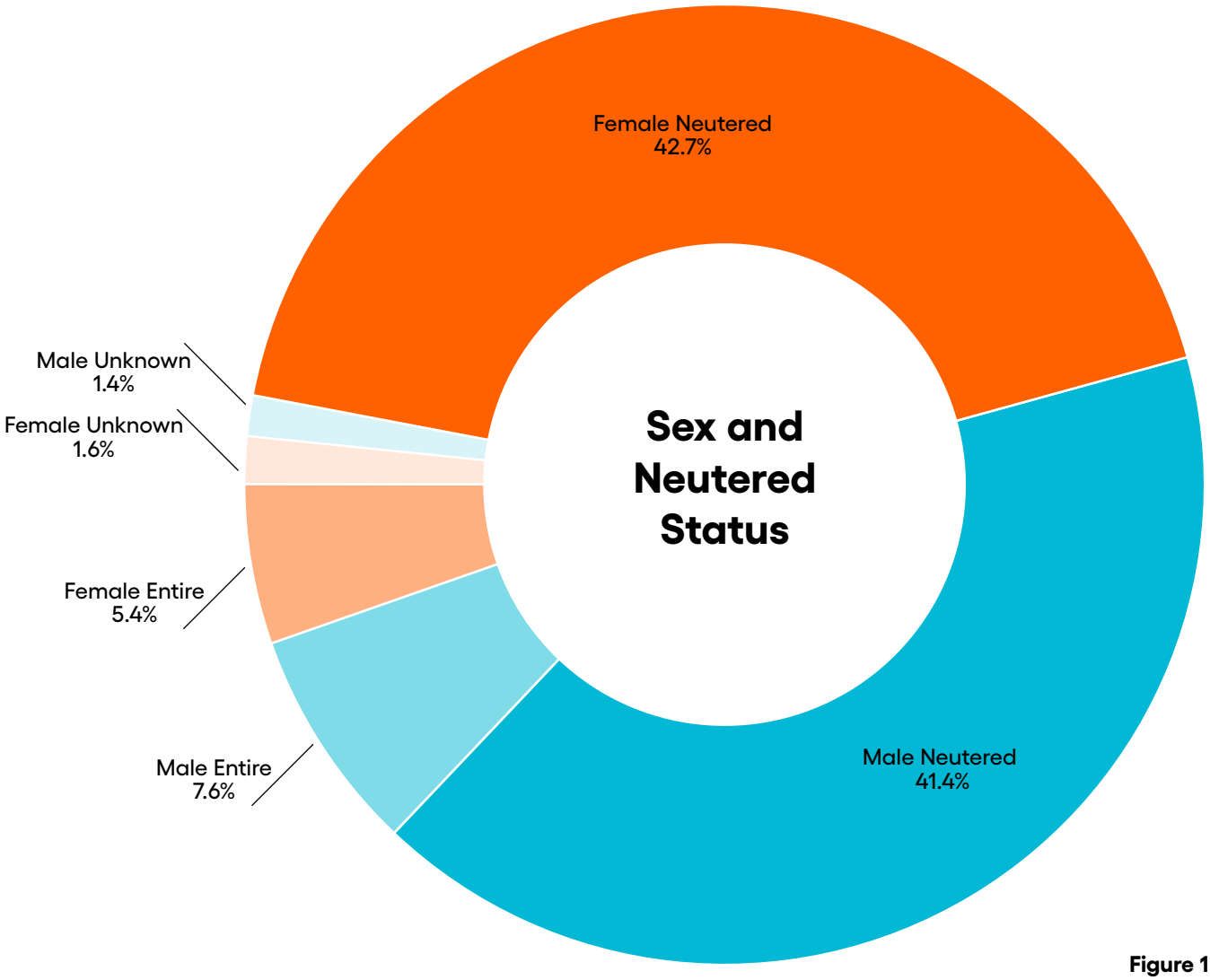


Figure 1

Table 1 - Sex and Neutered Status

	Number (n)	%
Male Entire	132	7.6%
Female Entire	94	5.4%
Male Neutered	722	41.4%
Female Neutered	746	42.7%
Male Unknown	24	1.4%
Female Unknown	28	1.6%
Total	1746	

3.2 Age

The age of patients was calculated based on their age at the time of the procedure (or at the time of registration if no procedure was performed). Age ranged from 3 months to 18 years. The average age of patients was 7.2 years (median=7 years). Age was recorded in 99.4% of pathways (n=1736). The age recorded in 6 cases was outside of the biologically possible range so were excluded from this analysis.

3.3 Breed

116 different breeds (or recognised variations) were reported (n=1746). The 5 most common were Labrador Retriever (9.1% n=158), English Springer Spaniel (4.8% n=83), Golden Retriever (4.5% n=79), Cockapoo (4.5% n=78) and Cocker Spaniel 3.9% n=68). 4% of patients were Crossbreeds (n=70) though this figure does not include non-Kennel Club registerable 'designer breeds' which are recorded separately. The breed was unknown or not recorded in 10.7% of patients (n=101). (**Figure 2**).

3.4 Body Condition Score

Body condition score was recorded by the veterinary surgeon following initial patient assessment in 51.8% patient pathways (n=904) using the Royal Canin 9 point scale [3]. 0.7% of patients were classified as Too Thin, 53% were of Ideal Bodyweight, whereas 25.9% were Overweight and, 20.5% were Too Heavy. (**Figure 3**).

Body Condition Score

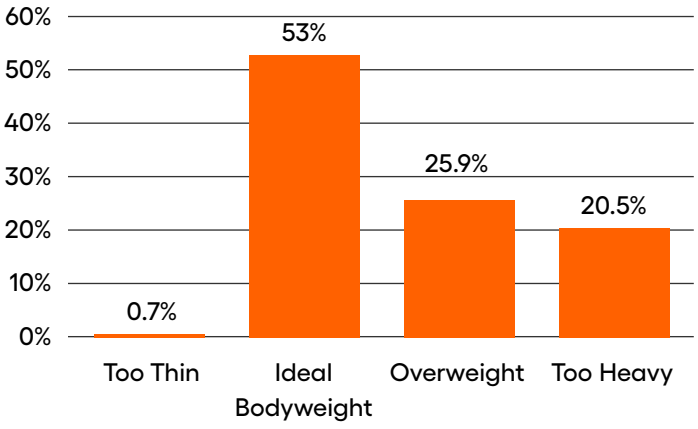
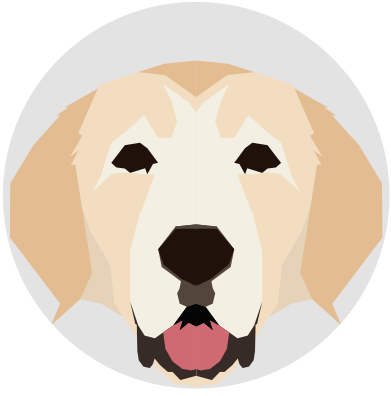


Figure 3

Breed



Labrador Retriever
9.1%

English Springer Spaniel
4.8%

Golden Retriever
4.5%

Cockapoo
4.5%

Cocker Spaniel
3.9%

Figure 2

3.5 Body Weight

Body weight was recorded in 72.2% of patient pathways (n=1261). The average patient weighed 23.25kg ±12.14 (median 21.9) range 1.6kg-80.3kg. Variation by gender and neutered status is displayed in **Table 2**.

3.6 Affected Limb

The affected limb was recorded in 96.8% of pathways (n=1691). The left pelvic limb was affected in 49.7%, the right in 41.1% and the remainder affected bilaterally (**Figure 4**).

Table 2 - Body Weight

	Mean	Median	SD	Range		(n)
Male Neutered	23.3	21.6	12.3	5.2	80.3	524
Male Entire	27.0	24.0	15.6	3.5	80.3	93
Male Unknown	20.7	19.0	12.3	3.7	49.6	22
Female Neutered	22.2	20.6	11.7	4.4	61.0	538
Female Entire	29.5	26.7	13.9	6.9	61.5	65
Female Unknown	26.1	20.0	15.7	0.0	57.6	19

The ages of patients ranged from 3 months to 18 years

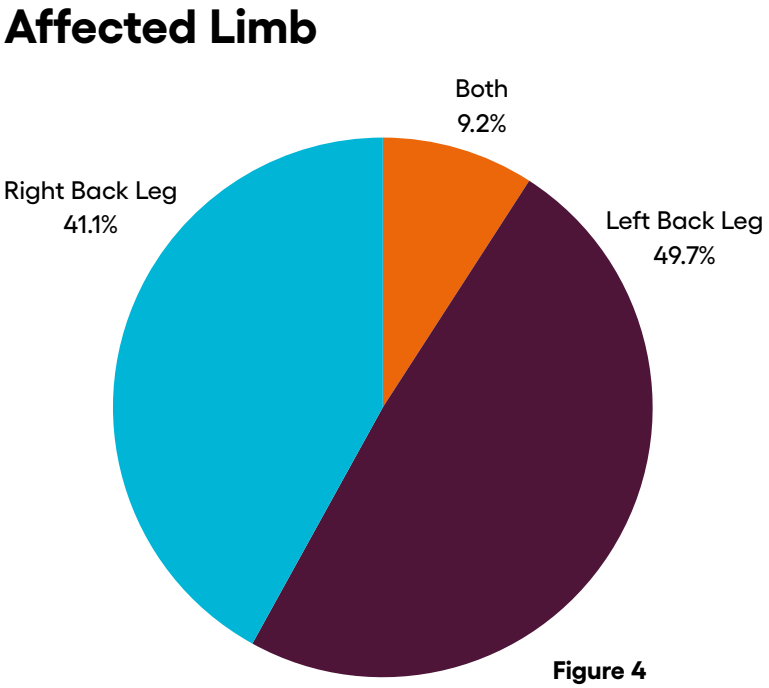


Figure 4

4. CLINICAL ASSESSMENT

4.1 Lameness

Lameness at the time of presentation was assessed by the veterinary surgeon using a 6 point scale [4]. Lameness was graded in the affected limb in 59.7% of pathways (n=1043) and in the unaffected limb in 58.2% of pathways (n=1016). The median lameness grade in the affected limb was 3/5 (**Table 3** and **Figure 5**).

4.2 Duration of Lameness

Duration of lameness was recorded by the owner in 95.0% of pathways (n=1659) (**Figure 6**).

Table 3 - Lameness Grade

Lameness Grade	Affected Limb (n)	Unaffected Limb (n)
0	25	871
1	43	73
2	226	30
3	409	27
4	241	11
5	99	4

4.3 Clinical Signs

Clinical signs were documented in 76.2% of patient pathways (n=1330). Lameness was reported in 96.9% (n=1290) of patient pathways, with stiffness after exercise reported in 19.0% (n=252) and reluctance to exercise reported in 11.6% (n=154). When recorded 21.9% of patient pathways had previously had cruciate surgery on the contralateral limb (n=364) and another medical issue was reported in 22.1% (n=344).

4.4 Clinical Examination Findings

Clinical examination findings were reported in 77.1% (n=1347) of pathways. The most commonly reported clinical findings were a stifle effusion 77.4% (n=1043) and cranial drawer 77.4% (n=1042) (**Table 4**).

Lameness was reported in 96.9% of pathways

Lameness Grade

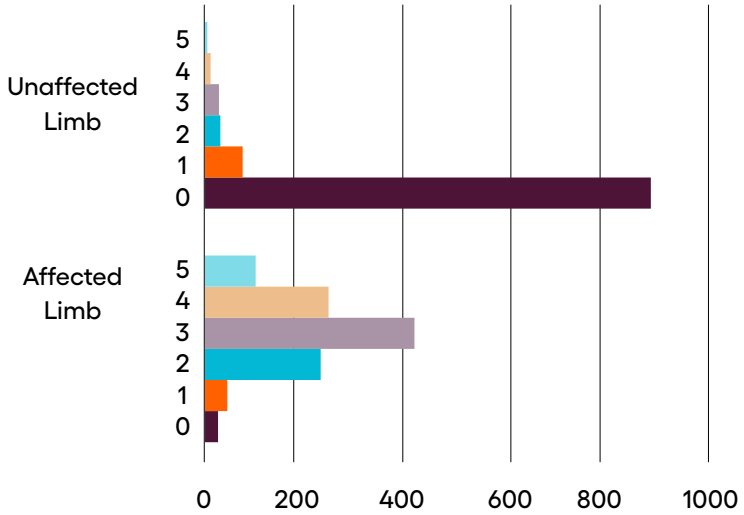


Figure 5

Duration of Lameness

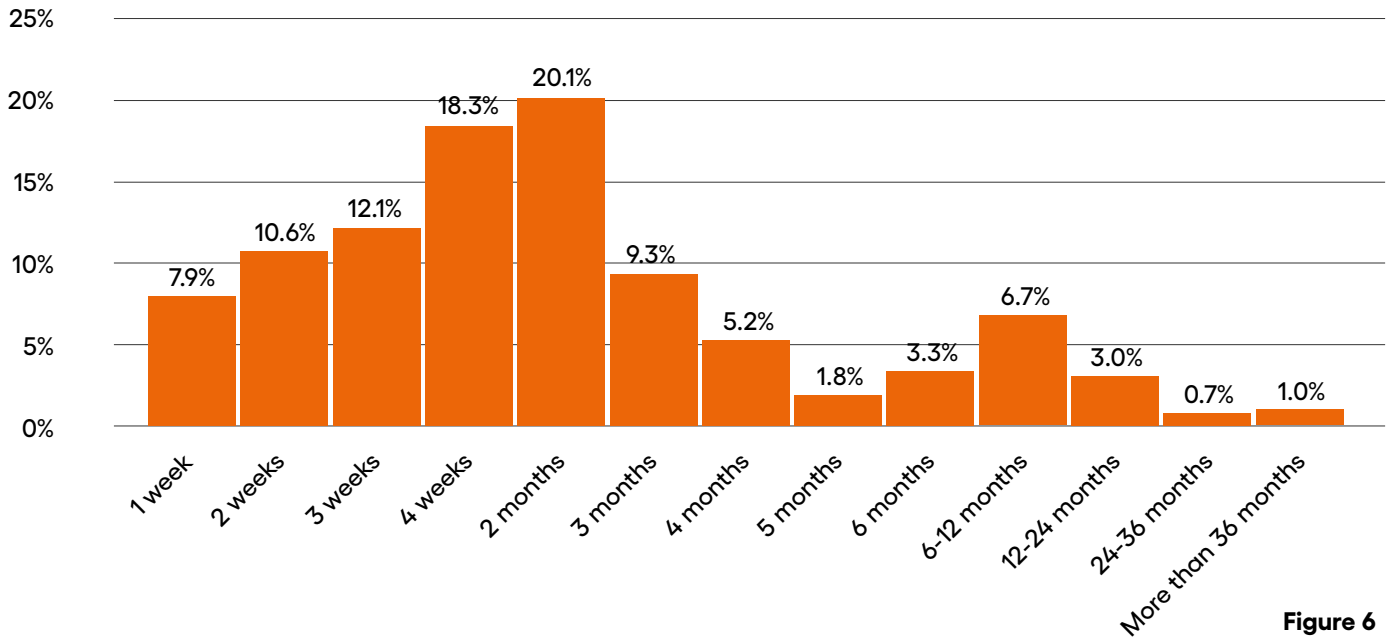


Figure 6

Table 4 - Clinical Examination Findings

Clinical Findings	Reported Findings (n)
Stifle Effusion	1043
Cranial Drawer	1042
Pain In Stifle Joint	775
Tibial Thrust	722
Medial Buttress	618
Hind Leg Extension with Sitting	319
Decreased Range of Motion	199
Crepitus	162
Other	83

5. SURGERY

5.1 Procedures

1319 surgical procedures were recorded. This represents 74.2% of patient pathways. The majority of procedures were osteotomies (**Table 5** and **Figure 7**). 21.9% (n=364) pathways had previously had surgery on the contralateral limb.

5.1.1 There is some variation in procedures over time. The proportion of TPLO performed has increased by 13.3%, whilst the proportion of TTA/MMP has decreased by 7.7%. There has been a 3.3% reduction in the proportion of extracapsular procedures performed, whilst the proportion of CCWO remains consistent. CBLO accounts for less than 1% of procedures each year. **Table 6** and **Figure 8** show the number of surgical procedures by year.

Table 5 - Surgical Procedures

	Number (n)	%
CBLO	7	0.5%
CCWO	375	28.4%
Extracapsular	41	3.1%
TPLO	820	62.2%
TTA/MMP	76	5.8%
Total	1319	

Table 6 - Surgical Procedures by Year

	2022 (n)	2023 (n)	2024 (n)
CBLO	2	0	4
CCWO	86	128	160
Extracapsular	16	12	12
TPLO	165	259	377
TTA/MMP	31	29	15
Total	300	428	568

5.2 Intra-articular Assessment

An intra-articular assessment was performed in 97.5% of procedures (n=1286). When recorded this was performed via an arthrotomy in 96.8% of patients (n=1245) and arthroscopically in the remainder.

5.3 Cruciate Tear

The degree of cranial cruciate ligament tear was recorded in 92.1% of these (n=1183) with 77.8% being complete tears and 22.2% partial tears.

5.4 Medial Meniscal Assessment

The state of the medial meniscus was recorded in 90.1% of these pathways (n=1188). A medial meniscal tear was identified in 34.7% of these patients. The tear was classified in 91.0% (n=417) of these cases with a bucket handle tear being most common (**Table 7** and **Figure 9**). A meniscal tear was recorded in 43.0% of patients with a complete tear of the cranial cruciate ligament (n=396) vs 20.5% of patients with a partial tear (n=54).

Table 7 - Meniscal Tear Type

	(n)	%
Bucket Handle Tear	310	74.3%
Complex Tear	16	3.8%
Degenerative Tear	7	1.7%
Flap Tear	41	9.8%
Radial Tear	16	3.8%
Vertical Longitudinal Tear	27	6.5%
Total	417	

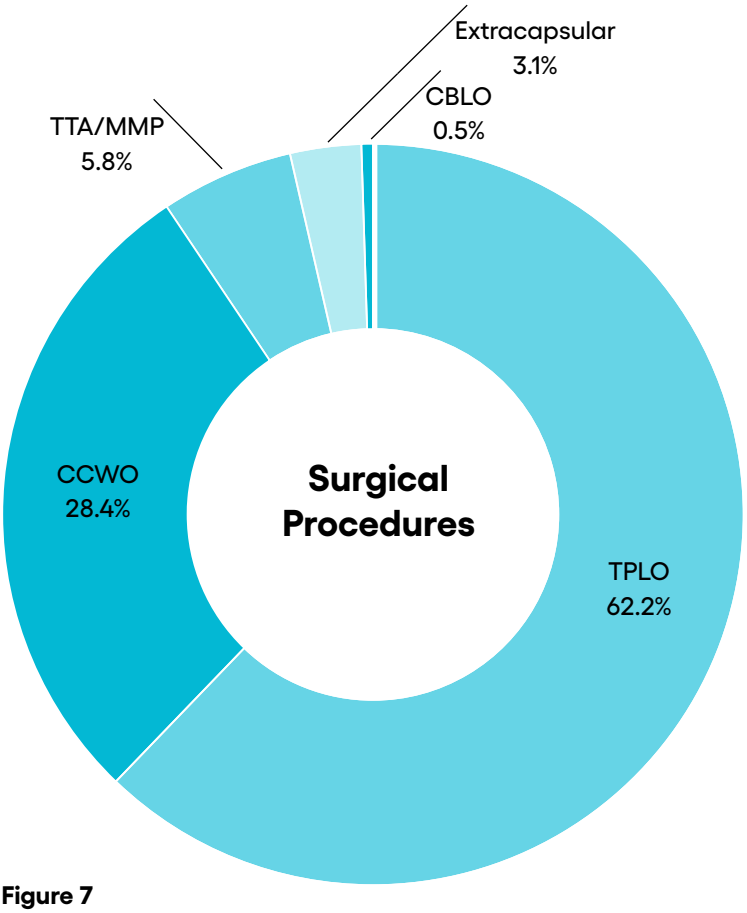


Figure 7

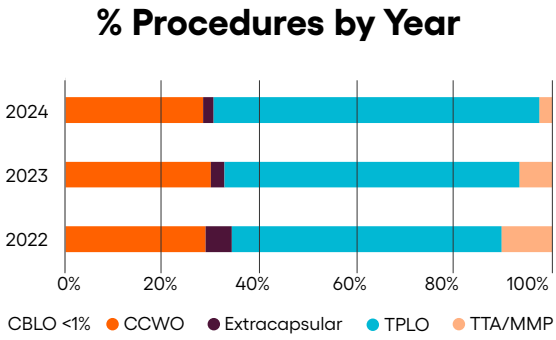


Figure 8

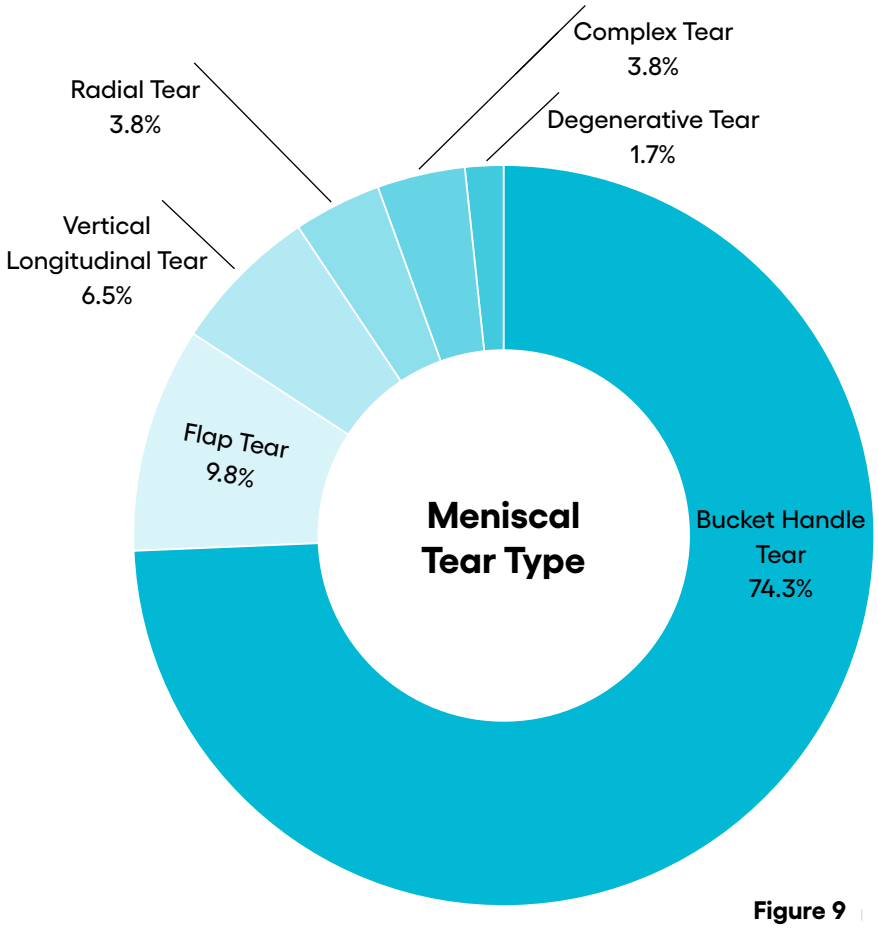


Figure 9

The proportion of TPLO performed has increased by 13.3%

5.4.1 Meniscal Treatment

A partial meniscectomy was performed in 92.3% of patients where a medial meniscal tear was reported (n=372). A meniscal release was reported in 2.2% of patients (n=9).

5.5 Additional Procedures

Additional procedures were performed in 7.4% (n=97) of procedures. Three additional procedures were reported: an additional osteotomy, correction of a medial patellar luxation, and placement of an anti-rotational suture. Both correction of a medial patellar luxation and placement of a lateral suture were performed in three patients. Placement of an anti-rotational suture without correction of a medial patellar luxation was only reported following TPLO (3.9% of TPLOs n=32) (**Table 8**).

Table 8 - Additional Procedures

Procedure	CCWO (n)	TPLO (n)	TTA/MMP (n)	Extracapsular (n)	Total
Medial Patellar Luxation	7	21	9	6	43
Anti-Rotational Suture	0	32	0	0	32
Medial Patellar Luxation and Anti-Rotational Suture	2	0	0	1	3
Osteotomy	2	17	0	0	19
Total	11	70	9	7	97

Most commonly reported meniscal tear: Bucket Handle Tear

Additional procedures were performed in 7.4% of surgeries

5.6 Regional Anaesthesia

Regional anaesthesia/analgesia was used in 82.6% of patients (n=1090). Most commonly this was a femoral and sciatic block. Regional anaesthesia classified as 'Other' mainly consisted of local splash blocks (**Table 9**).

Table 9 - Regional Anaesthesia

Regional Anaesthesia Technique	(n)	%
Femoral and Sciatic Nerve Block	588	53.9%
Epidural	293	26.9%
Other	148	13.6%
Intra-articular Analgesia	28	2.6%
Sciatic Nerve Block	15	1.4%
Lumbar Plexus Block	13	1.2%
Femoral Nerve Block	5	0.5%
Total	1090	

Most common technique: Femoral and Sciatic Nerve Block

Regional anaesthesia was used in 82.6% of patients

5.7 Surgery and Anaesthesia Time

Total surgical time and anaesthesia time were recorded in 77.0% (n=942) and 65.3% (n=846) of procedures respectively. Mean surgical time was 79.1±30.42 mins (median 75 mins) with a range of 15-270 mins. Mean anaesthesia time was 147.4±39.0 mins (median 145 mins) with a range of 40-240 mins. There was some variation between procedures (**Table 10**).

5.8 Antibiotic Usage

Peri-operative antibiotics were used in 99.9% of surgical procedures (n=1293). Post-operative antibiotics were used following 36.1% (n=464). The mean duration of the post operative course was 5.3 days (median 5 days, range 1-14 days).

Table 10 - Surgery and Anaesthesia Time

	Surgical Time				Anaesthesia Time			
Procedure	(n)*	Mean Time ± SD (mins)	Median (mins)	Range (mins)	(n)*	Mean Time ± SD (mins)	Median (mins)	Range (mins)
CBLO	5	104±31.30	110	50-130	4	170±14.14	170	150-180
CCWO	262	93.4±29.20	90	20-270	213	152.7± 38.96	160	40-240
Extracapsular	33	57.5±22.05	50	30-120	31	119.1±40.81	120	65-210
TPLO	581	75.1±29.25	70	30-255	533	146.7±36.49	140	60-240
TTA/MMP	61	64.8±25.51	60	15-150	65	146.6±52.02	135	40-240
Overall	942	79.1±30.42	75	15-270	846	147.4±39.02	145	40-240

* of procedures when recorded.

Surgical time ranged from 15 to 270 minutes

Outcomes are assessed using Client Reported Outcome Measures (CROMs). Owners are asked to complete both a baseline Liverpool Osteoarthritis in Dogs (LOAD) and a Canine Orthopaedic Index (COI).

6. OUTCOMES

Primarily outcomes are assessed using Client Reported Outcome Measures (CROMs). Owners are asked to complete both a baseline Liverpool Osteoarthritis in Dogs (LOAD) and a Canine Orthopaedic Index (COI). Follow up questionnaires are sent after the procedure at 6 weeks, 12 weeks, 6 months, 1 year and then at yearly intervals. Both LOAD and COI scores are calculated on a numeric basis with a lower score being representative of better mobility. The maximum LOAD and COI scores are 52 and 64 respectively.

In both CROMs a clinical improvement is represented by a lower score when compared to the previous assessment point. The numbers of outcome measures completed at each time point is shown in **Table 11**.

6.1 Procedure

Outcomes assessed by LOAD and COI are displayed in **Figure 10** and **Figure 11** respectively. There is an improvement following surgery with all procedures though variation in the amount and rate of improvement.

Table 11 - Completed Outcome Measures

Procedure	Baseline (n)		6 weeks (n)		3 months (n)		6 months (n)		1 year (n)		2 Years (n)		3 Years (n)	
CBLO	5	5	4	4	3	3	1	1	0	0	0	0	0	0
CCWO	336	332	183	178	167	167	141	141	85	84	36	36	6	6
Extracapsular	36	36	15	14	17	17	20	20	9	9	4	4	0	0
TPLO	736	729	492	478	444	436	335	332	228	226	91	90	20	19
TTA/MMP	70	70	42	41	37	37	29	29	21	21	9	9	3	3

Mean LOAD Score by Procedure

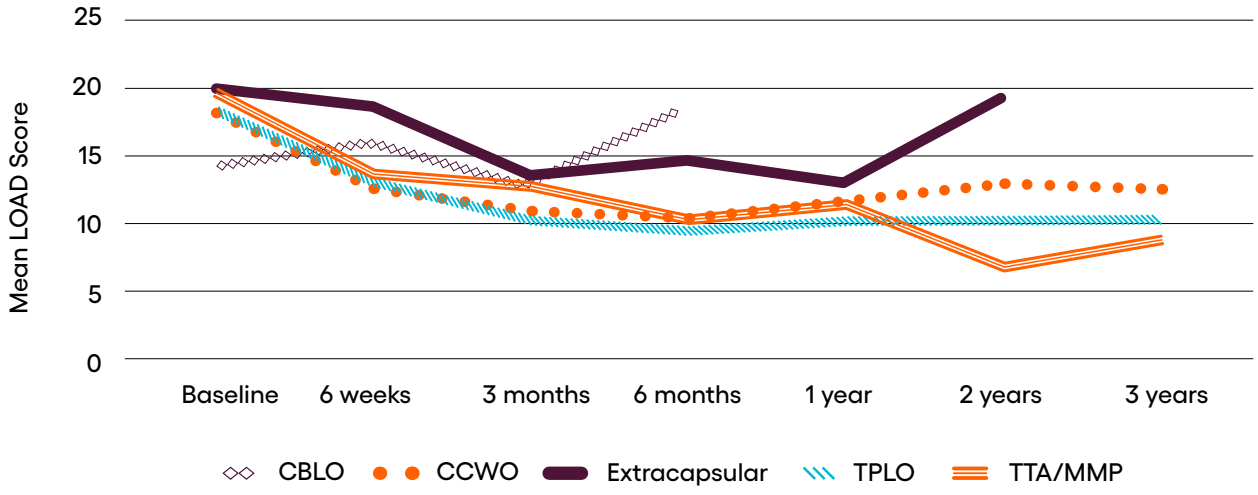


Figure 10

Mean COI Score by Procedure

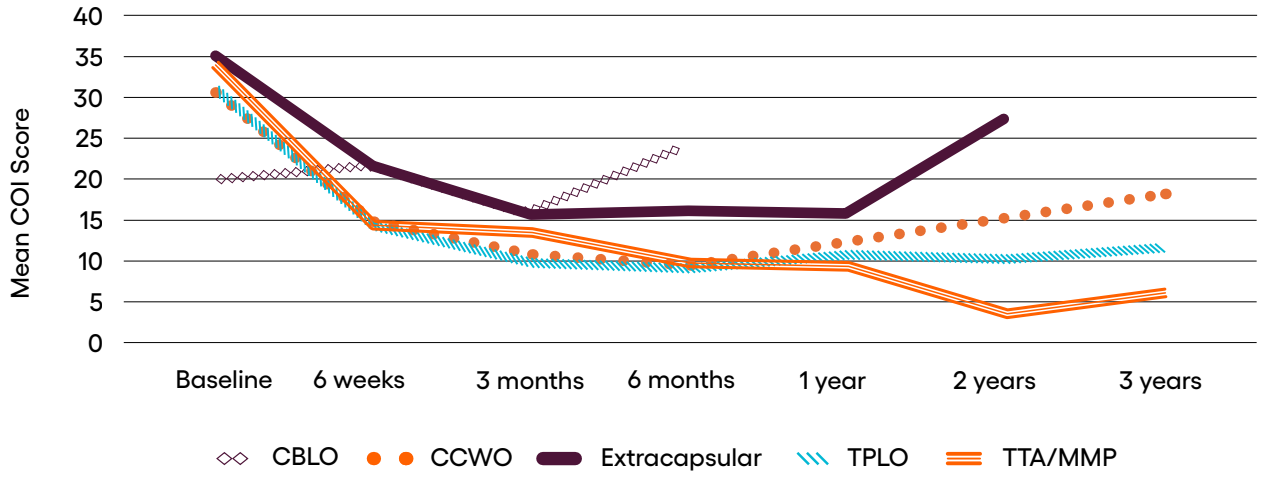


Figure 11

6.2 Partial vs Complete Tear
The effect on outcomes of a complete tear of the cranial cruciate ligament vs a partial tear is displayed in **Figure 12** (LOAD) and **Figure 13** (COI). The degree of partial tear was not evaluated.

Mean LOAD Score vs Cruciate Tear

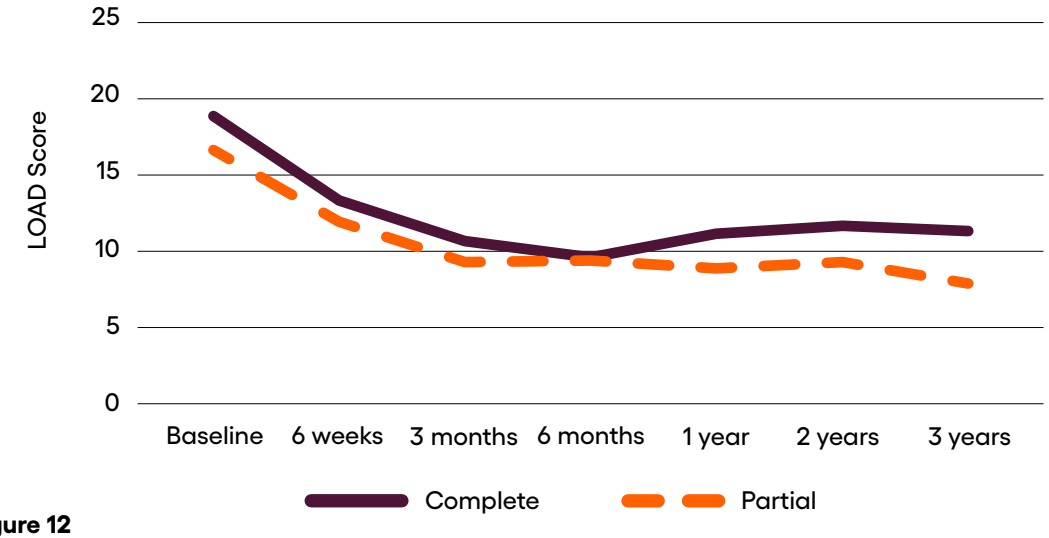


Figure 12

Mean COI Score vs Cruciate Tear

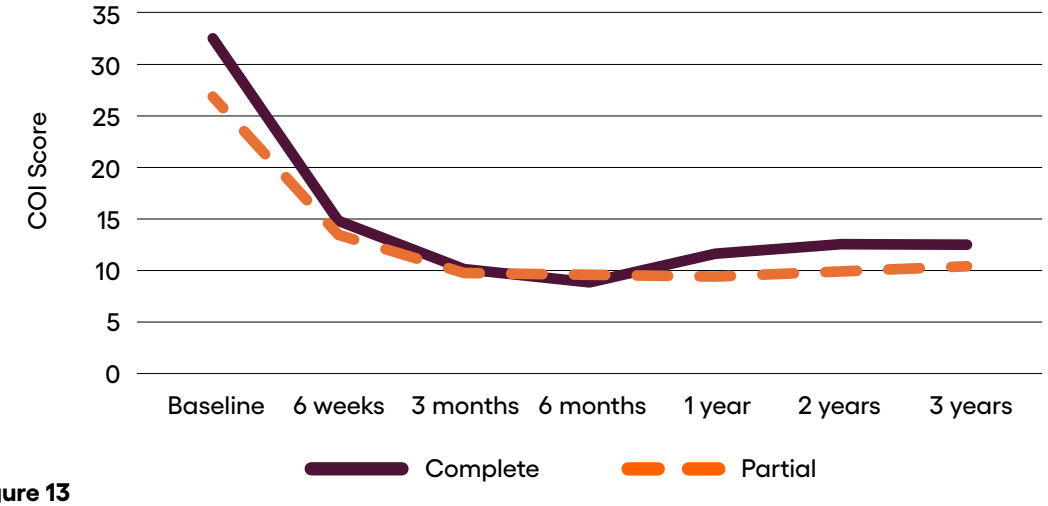


Figure 13

6.3 Meniscal Tear
Outcomes with a medial meniscal tear are compared by LOAD (**Figure 14**) and COI (**Figure 15**).

Mean LOAD Score vs Meniscal Tear

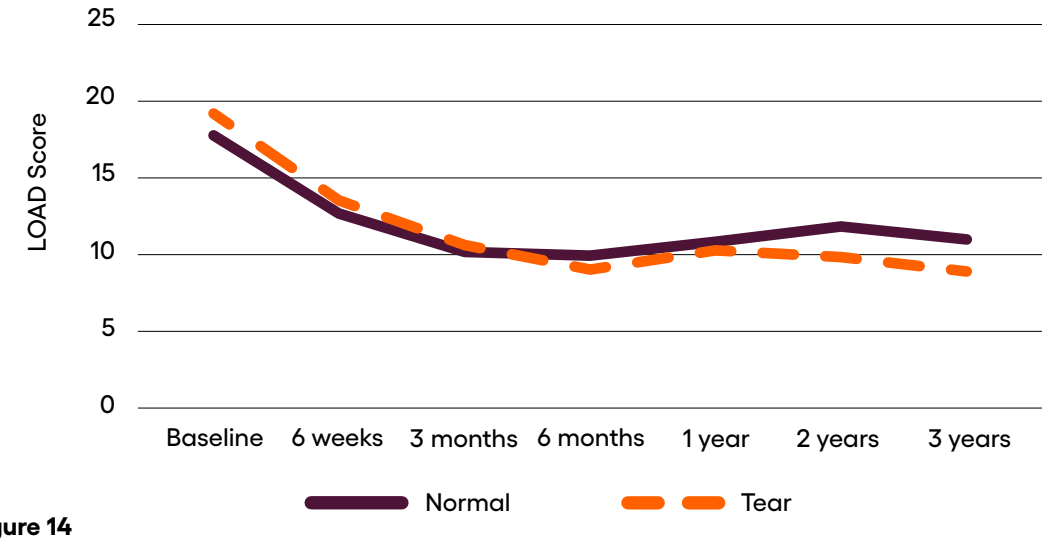


Figure 14

Mean COI Score vs Meniscal Tear

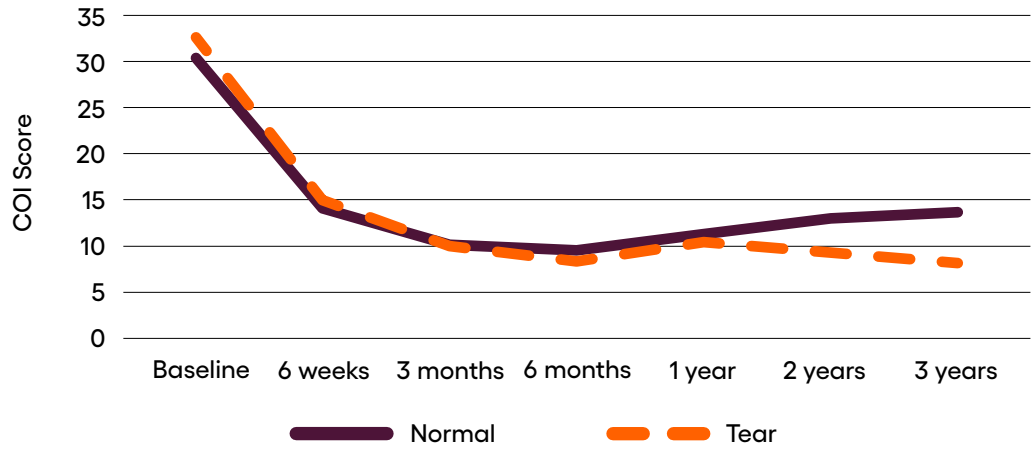
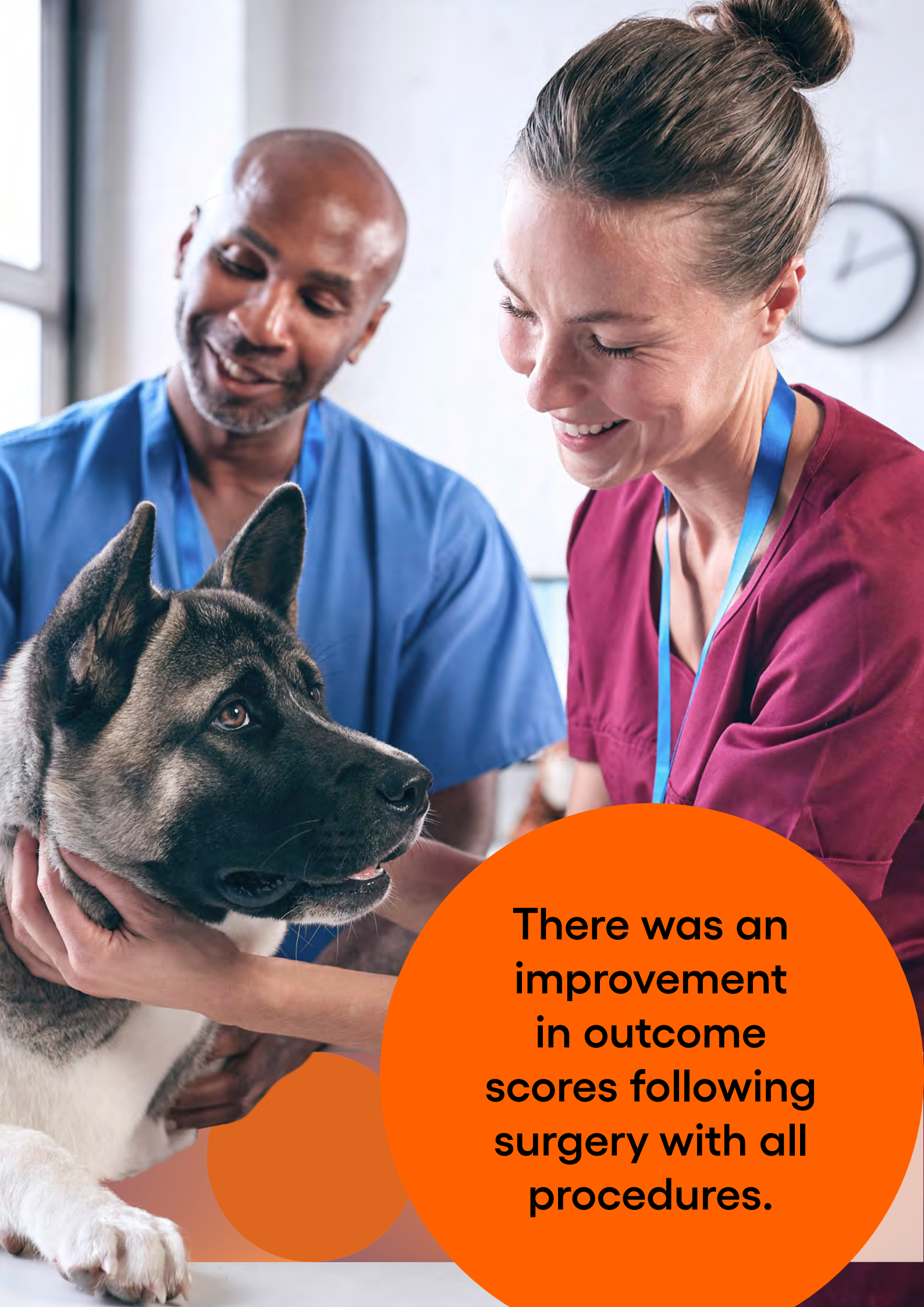


Figure 15



There was an improvement in outcome scores following surgery with all procedures.

6.4 Owner Assessment of Function
Owners were asked to rate their dog's function after surgery, as compared to before surgery. The majority of patients are rated as 'Much Better' at all time intervals. There is some variation between procedures at each time point (**Table 12** and **Figure 16**).

Majority of owners rated their pet's function as Much Better than before surgery

Follow up questionnaires are sent after a procedure at 6 weeks, 12 weeks, 6 months, 1 year and then at yearly intervals.

Table 12 - Owners' Rating of Leg Function Post-Op

Procedures	Much worse	Somewhat worse	About the same	Somewhat better	Much better
CBLO					
6 weeks	0.0%	25.0%	0.0%	50.0%	25.0%
3 months	0.0%	0.0%	0.0%	66.7%	33.3%
6 months	0.0%	0.0%	0.0%	0.0%	100.0%
1 year	-	-	-	-	-
CCWO					
6 weeks	0.6%	2.4%	5.4%	14.3%	77.4%
3 months	1.3%	0.6%	3.2%	7.1%	87.7%
6 months	0.0%	1.6%	3.9%	7.8%	86.8%
1 year	0.0%	4.1%	2.7%	6.8%	86.5%
Extracapsular					
6 weeks	0.0%	9.1%	0.0%	18.2%	72.7%
3 months	0.0%	0.0%	6.3%	6.3%	87.5%
6 months	0.0%	0.0%	5.0%	25.0%	70.0%
1 year	0.0%	0.0%	14.3%	14.3%	71.4%
TPLO					
6 weeks	1.1%	2.1%	6.8%	17.8%	72.1%
3 months	0.5%	0.5%	3.8%	9.3%	86.0%
6 months	0.7%	1.0%	2.0%	6.6%	89.7%
1 year	1.4%	1.9%	2.3%	9.3%	85.0%
TTA/MMP					
6 weeks	0.0%	0.0%	7.3%	4.9%	87.8%
3 months	0.0%	5.7%	8.6%	8.6%	77.1%
6 months	0.0%	0.0%	7.1%	10.7%	82.1%
1 year	0.0%	4.8%	0.0%	19.0%	76.2%

Owners' Rating of Leg Function Post-Op

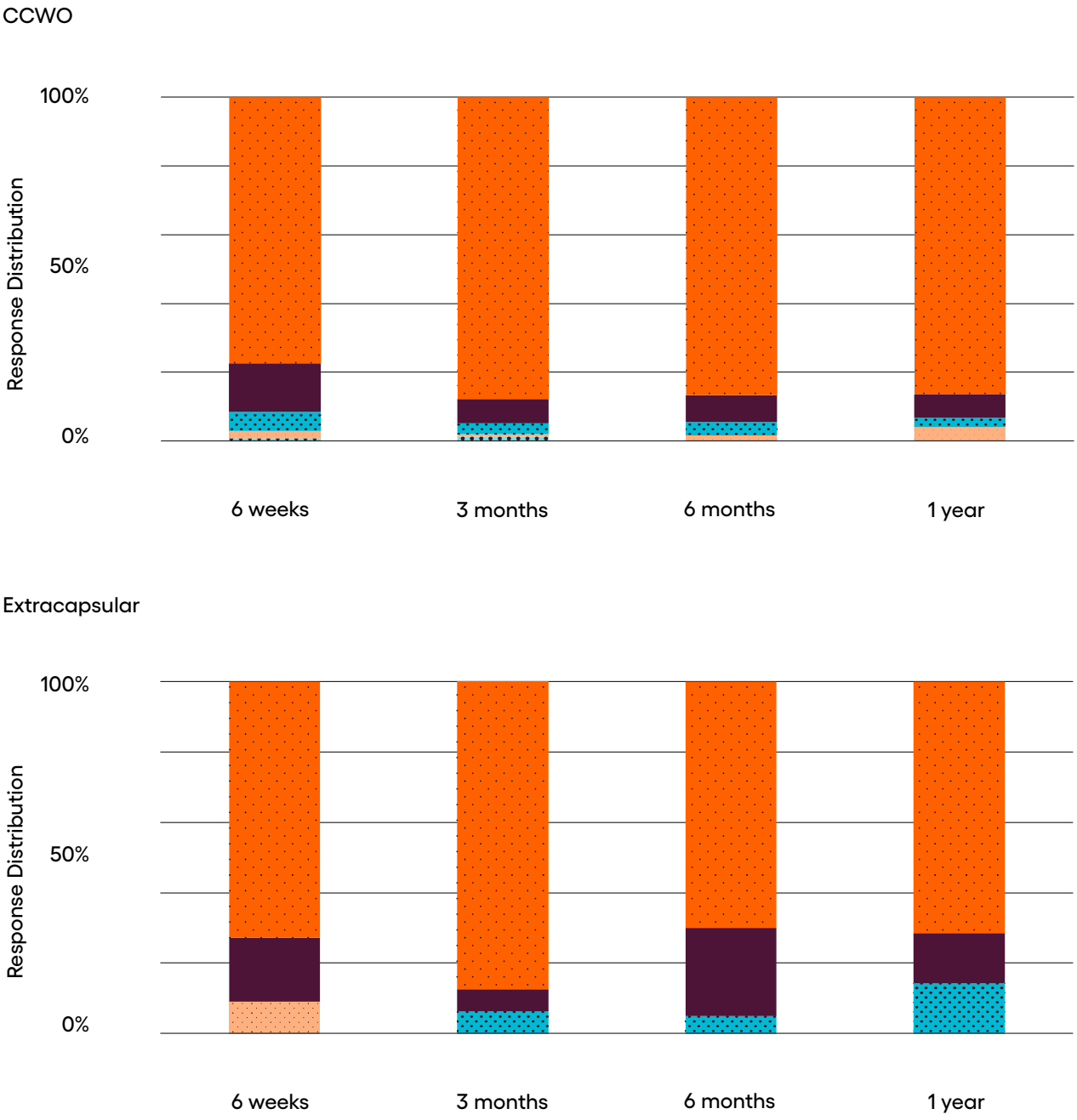


Figure 16

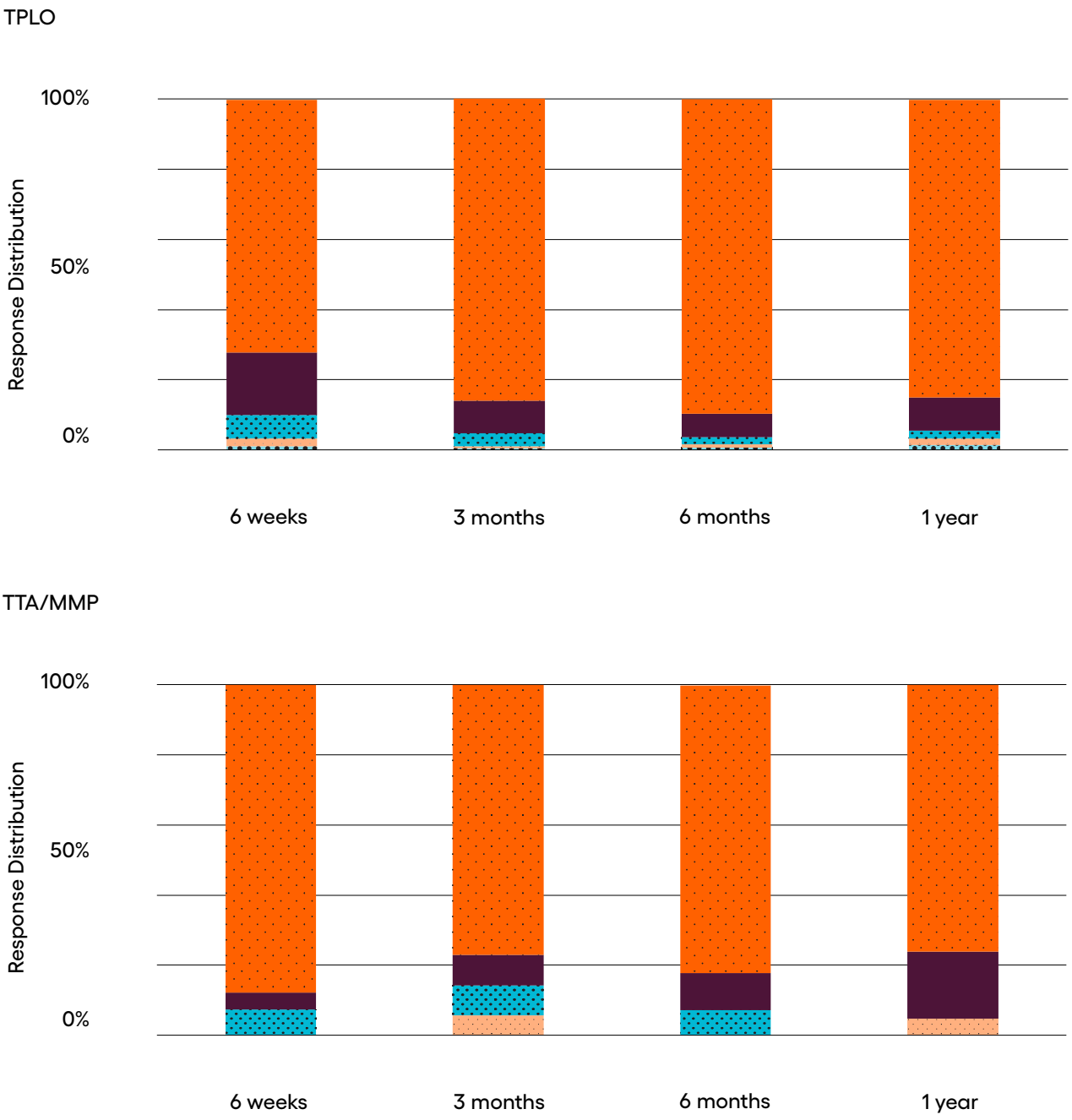

TPLO
100%
50%
0%
Response Distribution
6 weeks
3 months
6 months
1 year
TTA/MMP
100%
50%
0%
Response Distribution
6 weeks
3 months
6 months
1 year
Much better
Somewhat better
About the same
Somewhat worse
Much worse

Figure 16

6.5 Compliance

Compliance is defined as the proportion of requested outcome measures completed at each time interval. This is calculated from all pathways with a surgical procedure (pathways with a baseline outcome measure completed without a subsequent surgical procedure are excluded). Compliance is estimated with this methodology as missing data at one time point does not mean subsequent surveys are not completed. (see **Table 13** and **Figure 17**).

Table 13 - Compliance

Compliance	Baseline	6 weeks	3 months	6 months	1 year	2 years
COI	88.8%	54.7%	51.2%	45.1%	40.6%	32.1%
LOAD	89.7%	56.2%	51.7%	45.3%	40.8%	32.1%
Owner Assessment of Limb Function	N/A	52.0%	50.3%	44.3%	40.2%	31.5%

Client Reported Outcome Measure Compliance

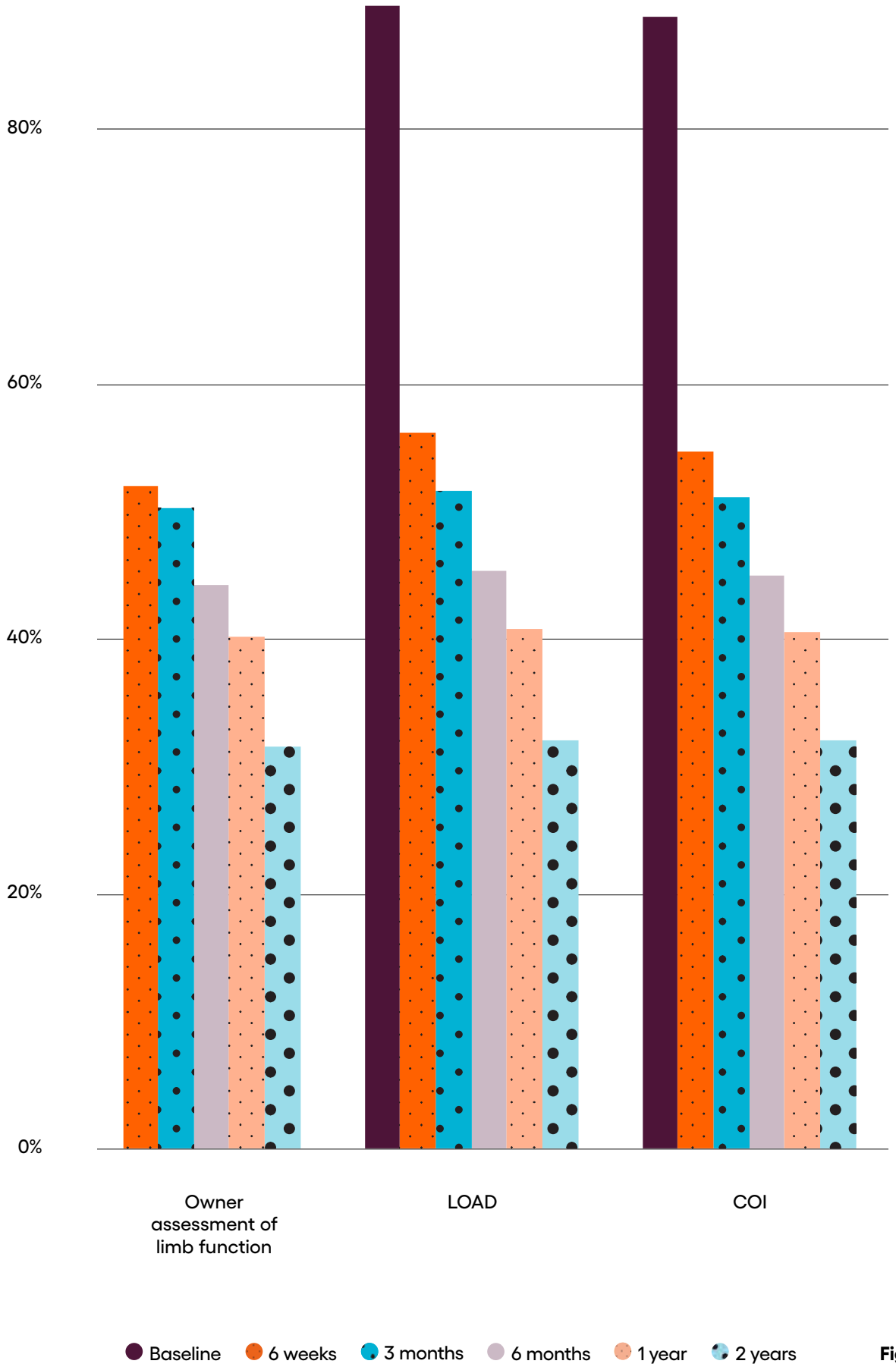


Figure 17

7. ADVERSE EVENTS

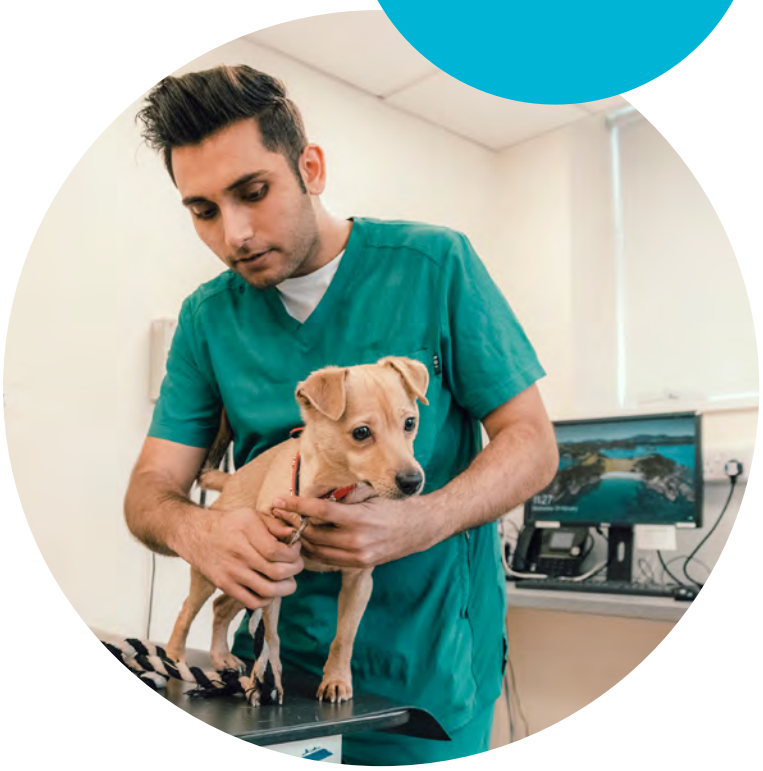
7.1 Adverse Events

Intra-operative adverse events were reported in 6.4% of surgical procedures (n=83). The most common adverse event was significant haemorrhage (n=18) (**Table 14**). The other adverse events reported included a range of issues relating to equipment, implants, regurgitation and anaesthesia related issues.

Table 14 - Adverse Events

Adverse Event	Number (n)	Percentage %
Significant Haemorrhage	18	21.7%
Screw in Joint	4	4.8%
Fibular Fracture	3	3.6%
Hinge Break	4	4.8%
Screw Placed in Osteotomy	2	2.4%
Broken Holding Pin	1	1.2%
Distal Cortex Fracture	1	1.2%
Incorrect Bone Tunnel Position	1	1.2%
Break in Aseptic Technique	1	1.2%
Mal-alignment	1	1.2%
Wire Cut Through Bone	1	1.2%
Other	41	49.4%
Not Described	5	6.0%
Total	83	

Haemorrhage was the most commonly reported adverse event



Veterinary surgeons can report complications as they occur or at the time of a follow up assessment.

8. COMPLICATIONS

Owners are asked to report complications each time they complete a follow up questionnaire. Veterinary surgeons can report complications as they occur or at the time of a follow up assessment.

8.1 Complication Rates

The overall vet reported complication rate was 17.2% (n=223). The overall owner reported complication rate was 21.3% (n=274). The variation by procedure is displayed in **Table 15** and **Figure 18**. The complications reported by time frame are shown in **Figure 19**. A complication represents a pathway where one or more complications were reported. The veterinary reported complications, frequency of occurrence and timeframe are listed in **Appendix 1**. The owner reported complications, frequency of occurrence and timeframe are listed in **Appendix 2**.

Table 15 - Complication Rates by Procedure

Procedures		Complications			
		Vet Reported		Owner Reported	
	(n)		(n)		(n)
CBLO	7	14.3%	1	28.6%	2
CCWO	375	16.0%	60	16.5%	62
Extracapsular	41	2.4%	1	2.4%	1
TPLO	820	17.8%	146	22.7%	186
TTA/MMP	76	19.7%	15	30.3%	23
Total	1319		223		274

Overall vet reported complication rate was 17.2%

Complication Rates by Procedure

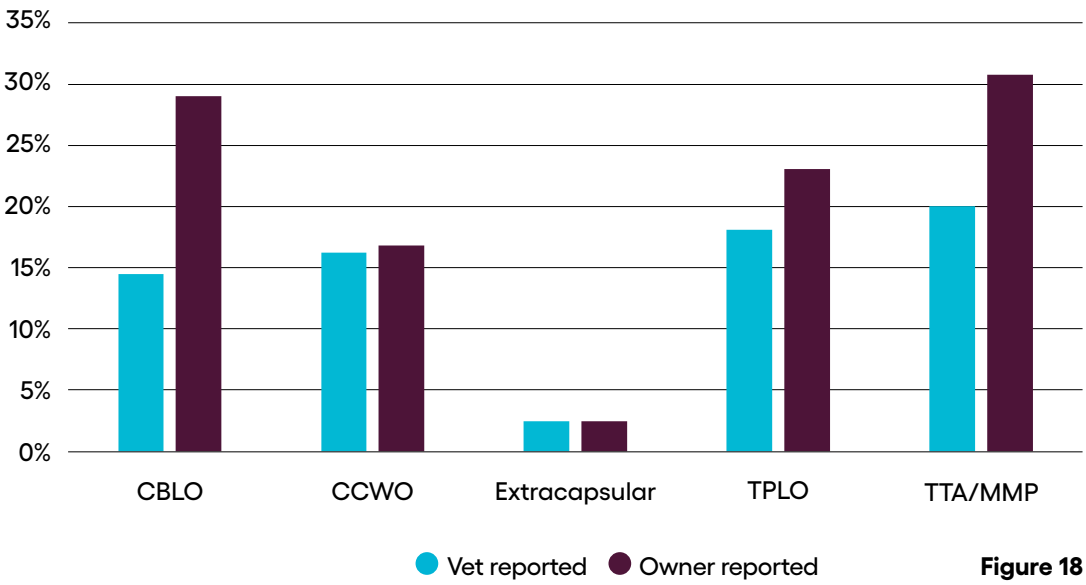


Figure 18

Complication Rates by Time Frame

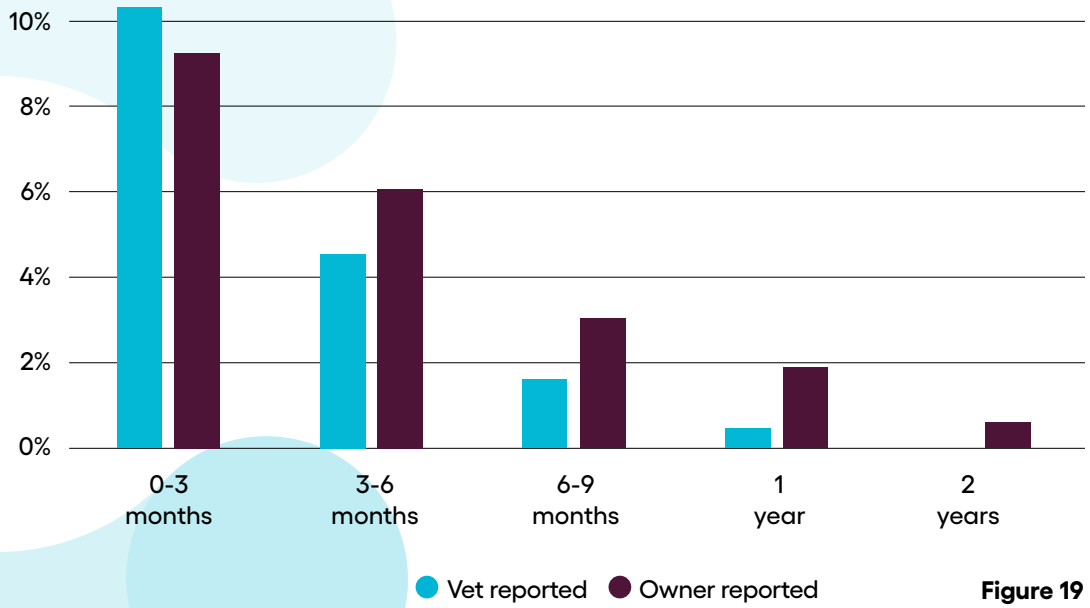


Figure 19

9. FUTURE FOCUS AND DEVELOPMENT

We are committed to expanding participation in the CCR, inspiring those already involved to continue their invaluable contributions, and reaching out in new areas where increased representation is crucial.

This includes enhancing data collection for extracapsular procedures and encouraging veterinary surgeons of all designations, building on data from specialists and general practitioners. By building a comprehensive dataset that reflects all demographics and procedures, we aim to support informed shared decision-making to benefit all dogs with canine cruciate ligament rupture.

Our vision extends beyond the UK. We aim to collaborate with international partners, expanding the Registry across continents to uncover global insights. With robust data already within the Registry, we are poised to engage with various groups and organisations, delving deeper into analysis and strengthening our evidence base.

However, future progress depends on the continued action of participating veterinary surgeons. The Registry provides an innovative platform to support veterinary surgeons in their clinical auditing activity. These annual reports are provided as a benchmark. If you've submitted data to the Registry, compare your results with those presented in this report, and use the personalised reporting function within the Registry to support quality improvement in your practice.

In its third year, the Registry has now collected ample data to enable us to partner with other groups and individuals to analyse and interrogate the anonymised evidence base. If you are passionate about our data and wish to work on a specific project to uncover new insights, please reach out. Together, we can improve outcomes, and minimise complications, for all patients undergoing cruciate surgery. Email us at ebvm@rcvsknowledge.org.

10. INFORMATION FOR USERS

Are you a dog owner?
Discover how the CCR could benefit dogs in the UK.
caninecruciateregistry.org/dog-owners

Do you work in veterinary practice?
Find out how you can use the CCR to improve outcomes.
caninecruciateregistry.org/veterinary-professionals

Are you ready to start contributing to the CCR?
Sign up to take part.
caninecruciateregistry.org/veterinary-professionals/vet-surgeons-registration-form

Do you want to know more about cruciate ruptures?
Learn about the most common surgical procedures.
caninecruciateregistry.org/dog-owners/common-surgical-procedures

Ready to compare your own results?
Learn how to use the personalised reporting function.
caninecruciateregistry.org/an-introduction-to-the-reporting-tools-on-the-canine-cruciate-registry

APPENDIX 1 VET REPORTED COMPLICATIONS

Table 15 - Vet Reported Complications

Complication	Procedure	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
Bandage Complications	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	1	0	0	0	0
	TTA/MMP	0	0	0	0	0
Delayed Union	CBLO	1	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	2	2	0	0	0
	TTA/MMP	0	0	0	0	0
Draining Tract	CBLO	0	0	0	0	0
	CCWO	1	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	2	3	0	0	0
	TTA/MMP	2	0	0	0	0
Fibular Fracture	CBLO	0	0	0	0	0
	CCWO	1	1	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	6	1	0	0	0
	TTA/MMP	0	0	0	0	0
Implant Failure	CBLO	0	0	0	0	0
	CCWO	3	0	1	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	0	0	0	0
	TTA/MMP	0	0	0	0	0
Incisional Oedema / Haematoma / Bruising	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	1	0	0	0	0
	TTA/MMP	0	0	0	0	0
Infection	CBLO	0	0	0	0	0
	CCWO	5	3	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	27	12	1	0	0
	TTA/MMP	3	2	1	0	0
Kirschener Wire Loosening	CBLO	0	0	0	0	0
	CCWO	1	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	0	0	0	0
	TTA/MMP	0	0	0	0	0

Table 15 - Vet Reported Complications

Complication	Procedure	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
Late Meniscal Tear	CBLO	0	0	0	0	0
	CCWO	2	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	0	0	0	0
	TTA/MMP	0	0	0	0	0
Medial Patellar Luxation	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	1	1	0	0
	TTA/MMP	0	0	0	0	0
Meniscal Tear	CBLO	0	0	0	0	0
	CCWO	0	4	2	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	4	6	2	0
	TTA/MMP	1	0	0	0	0
Other	CBLO	1	0	0	0	0
	CCWO	9	9	2	1	0
	Extracapsular	1	0	0	0	0
	TPLO	28	8	6	3	0
	TTA/MMP	4	0	0	0	0
Patellar Fracture	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	1	0	0	0	0
	TTA/MMP	0	0	0	0	0
Patellar Tendonitis	CBLO	0	0	0	0	0
	CCWO	0	1	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	7	7	0	0	0
	TTA/MMP	0	0	0	0	0
Residual Joint Laxity	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	0	0	0	0
	TTA/MMP	0	0	0	0	0
Rotational Instability	CBLO	0	0	0	0	0
	CCWO	6	1	1	0	0
	Extracapsular	0	0	0	0	0
	TPLO	1	1	0	0	0
	TTA/MMP	0	0	0	0	0

Table 15 - Vet Reported Complications

Complication	Procedure	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
Screw Loosening	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	1	0	1	0	0
	TTA/MMP	0	0	0	0	0
Seroma/Swelling	CBLO	0	0	0	0	0
	CCWO	3	3	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	3	1	0	0
	TTA/MMP	0	0	0	0	0
Tibial Fracture	CBLO	0	0	0	0	0
	CCWO	0	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	0	0	0	0
	TTA/MMP	1	0	0	0	0
Tibial Tuberosity Fracture	CBLO	0	0	0	0	0
	CCWO	2	1	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	0	1	0	0	0
	TTA/MMP	1	0	0	0	0
Traumatic Wound Dehiscence	CBLO	0	0	0	0	0
	CCWO	2	0	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	9	0	1	0	0
	TTA/MMP	1	0	0	0	0

Procedure	Total	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
CBLO	2	2	0	0	0	0
CCWO	65	35	23	6	1	0
Extracapsular	1	1	0	0	0	0
TPLO	151	86	43	17	5	0
TTA/MMP	16	13	2	1	0	0

* The following complications are selectable options but were not reported: Anchor Failure, Bone Tunnel Widening, Extracapsular Suture Failure, Iatrogenic Tibial Deformity, Lateral Patellar Luxation, Osteomyelitis, Patella Alta, Patella Baja, Peroneal Nerve Injury, Ring Sequestrum, Tibial Deformity.

APPENDIX 2 OWNER REPORTED COMPLICATIONS

Table 16 - Owner Reported Complications

Complication	Procedure	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
Clicking/Grinding Sound	CBLO	0	0	2	0	0
	CCWO	2	3	0	2	2
	Extracapsular	0	0	0	0	0
	TPLO	5	6	2	0	1
	TTA/MMP	1	1	1	1	1
Inability to walk	CBLO	0	0	0	0	0
	CCWO	1	5	1	2	0
	Extracapsular	1	0	0	0	0
	TPLO	11	10	10	5	1
	TTA/MMP	1	1	0	1	0
Infection - Deep	CBLO	0	1	0	0	0
	CCWO	3	2	1	1	0
	Extracapsular	0	0	0	0	0
	TPLO	8	5	5	1	1
	TTA/MMP	2	2	1	0	0
Infection Skin Only	CBLO	0	0	0	0	0
	CCWO	4	4	1	0	0
	Extracapsular	1	0	0	0	0
	TPLO	9	4	1	1	0
	TTA/MMP	1	2	0	0	0
Joint/Leg Swelling	CBLO	0	0	0	0	0
	CCWO	5	6	0	3	0
	Extracapsular	0	0	0	0	0
	TPLO	24	15	5	1	0
	TTA/MMP	2	1	1	0	0
On-Going Pain	CBLO	1	1	0	0	0
	CCWO	3	7	1	3	1
	Extracapsular	1	0	0	0	0
	TPLO	17	14	6	5	2
	TTA/MMP	1	1	1	1	0
Other	CBLO	0	0	0	0	0
	CCWO	12	11	9	2	0
	Extracapsular	0	1	0	0	0
	TPLO	31	26	7	8	2
	TTA/MMP	2	3	0	2	0
Wound Problems	CBLO	0	0	0	0	0
	CCWO	1	1	0	0	0
	Extracapsular	0	0	0	0	0
	TPLO	19	5	0	0	0
	TTA/MMP	2	2	0	0	0

Table 16 - Owner Reported Complications

Procedure	Total	0-3 months (n)	3-6 months (n)	6-9 months (n)	1 year (n)	2 year (n)
CBLO	5	1	2	2	0	0
CCWO	99	31	39	13	13	3
Extracapsular	4	3	1	0	0	0
TPLO	273	124	85	36	21	7
TTA/MMP	35	12	13	4	5	1

RCVS Knowledge would like to say thank you to all the veterinary professionals and owners who have contributed data to the Canine Cruciate Registry.

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[1] Walton, M.B. et al. (2013) Evaluation of construct and criterion validity for the 'Liverpool Osteoarthritis in Dogs' (LOAD) clinical metrology instrument and comparison to two other instruments. *PLoS One*, 8 (3), e58125. https://doi.org/10.1371/journal.pone.0058125

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ACKNOWLEDGEMENTS

RCVS Knowledge would like to say thank you to all the veterinary professionals and owners who have contributed data to the Canine Cruciate Registry.

With your continued help we hope to improve the outcomes for dogs with cranial cruciate ligament ruptures.

If you have signed up, but haven't enrolled any patients yet, please get involved. Your data will make a difference, not only to your own patients but to all dogs undergoing cruciate surgery in the future.

Help us, help you, help your patients: caninecruciateregistry.org

The RCVS Knowledge Canine Cruciate Registry uses two validated Client-Reported Outcome Measures (CROMS), that have been specifically developed to assess outcomes in canine orthopaedics. These are the 'Liverpool Osteoarthritis in Dogs' instrument, developed at the University of Liverpool, and the Canine Orthopaedic Index, developed by the American College of Veterinary Surgeons.

We are grateful to Elanco, the University of Liverpool, and the American College of Veterinary Surgeons for allowing us to use these questionnaires in this project.

The RCVS Knowledge Canine Cruciate Registry is endorsed by the British Veterinary Orthopaedic Association.

The RCVS Knowledge Canine Cruciate Registry is managed on a day-to-day basis by Amplitude Clinical Outcomes, a global leader in online registry software.

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ISBN - 978-0-902183-49-0

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