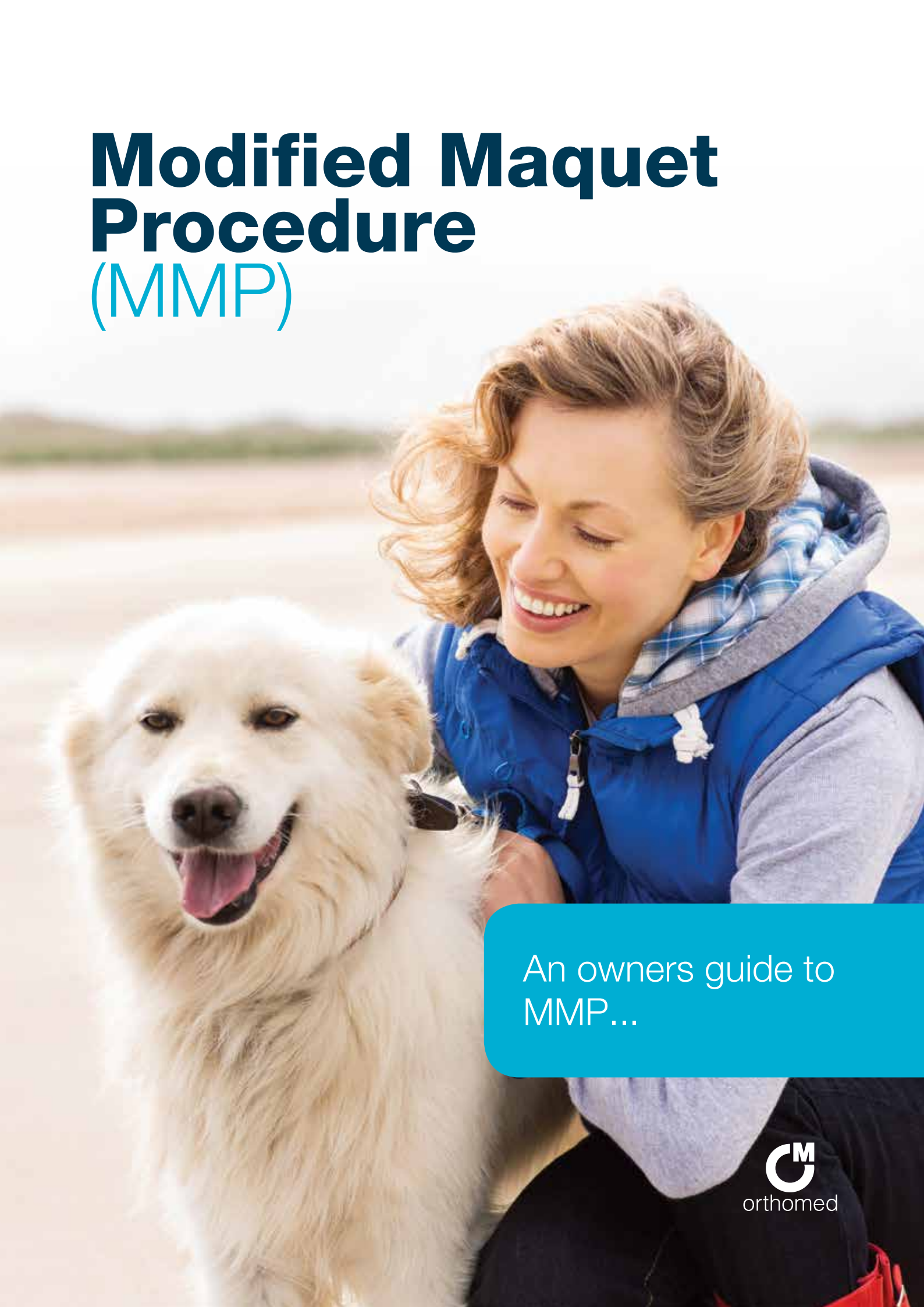
Modified Maquet Procedure (MMP)



An owners guide to MMP...

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Introduction

Hind limb lameness caused by cranial cruciate ligament (CCL) failure is common in pet and working dogs.

Different vets might call this CCL 'failure', CCL 'rupture' or CCL 'disease' but they are all talking about the same problem.

While some dogs will improve with conservative/ medical treatment – usually a lengthy period of limited leash exercise and an extended course of a non-steroidal anti-inflammatory (NSAID) medicine, the result is often disappointing, especially in larger and more active pets and working dogs. For these dogs, surgical treatment is usually recommended.

Your veterinary surgeon believes that your dog's lameness is due to CCL failure and has advised surgical treatment using the Modified Maquet Procedure (MMP).

The information in this booklet is provided to help you understand the operation: the potential benefits; the size and nature of the associated risks; the likelihood of seeing a satisfactory outcome and the important part that you will play giving your dog the best chance of an uneventful return to normal, unrestricted pain-free athletic activity.

Contents

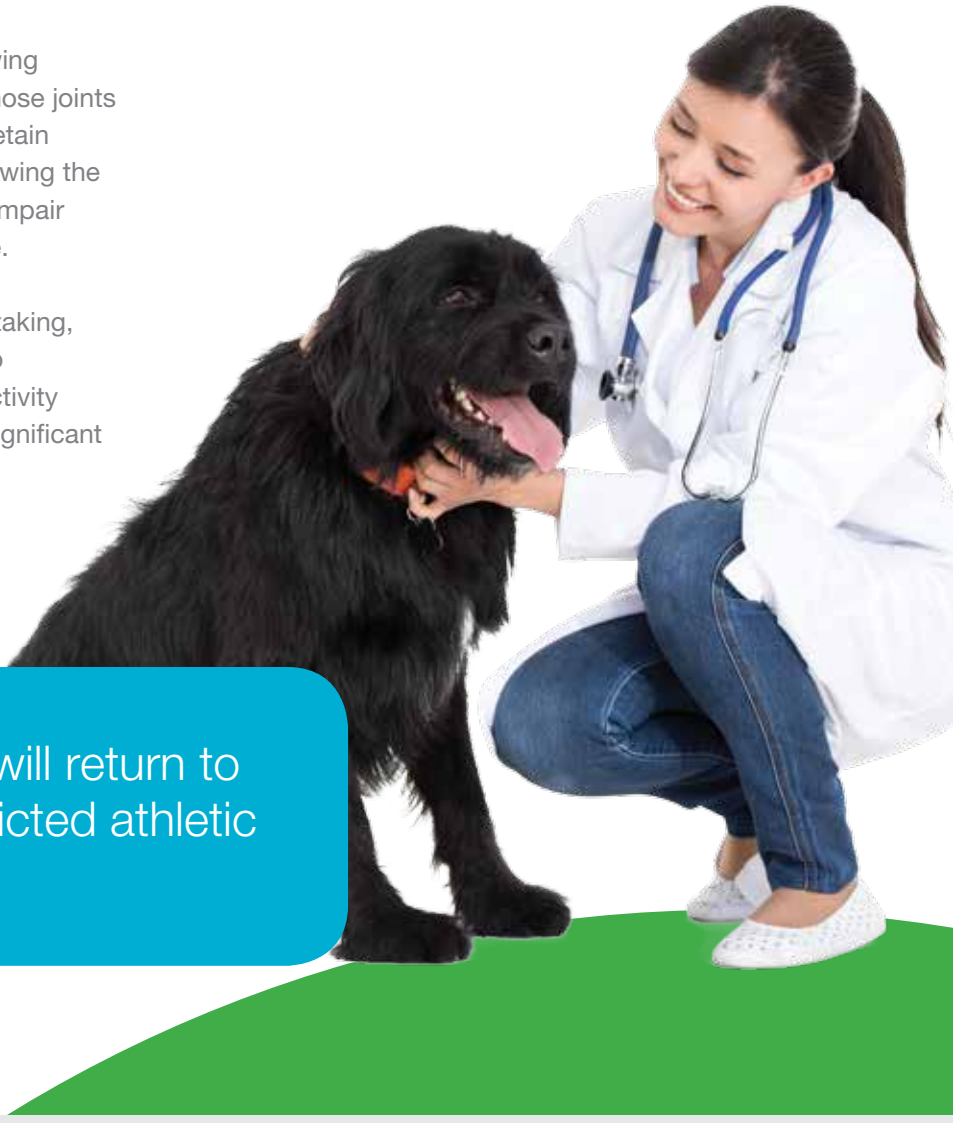
" Your veterinary surgeon believes that your dog's lameness is due to CCL failure and has advised surgical treatment using the Modified Maquet Procedure (MMP) "

How successful is MMP?

Following MMP surgery we aim to restore full athletic function. By that we mean that whatever your dog was able to do before the cruciate ligament failed, they will again be capable of that level of activity.

We expect all dogs to be pain free following MMP, but some dogs (typically those whose joints were arthritic before MMP surgery) will retain some stiffness and a mild lameness following the operation, though that does not usually impair their level of activity or their quality of life.

Although MMP is a major surgical undertaking, most dogs (more than 75%) will return to previous levels of unrestricted athletic activity and function without encountering any significant complications.



More than 75% of dogs will return to previous levels of unrestricted athletic activity and function

From time to time, complications can blight any surgical procedure and MMP is no exception. Although occasionally serious, experience shows that most of the complications associated with MMP surgery can be resolved effectively.

Minor complications

Minor complications are defined as those that resolve completely and spontaneously, without the need for specific medical or surgical treatment and these are seen in about 25% of MMP patients. Typically these minor complications are swellings or bruising of the surgical wound that resolve completely over a few days.

Major (medical) complications

Major (medical) complications are defined as those that resolve completely, but require additional, unplanned medical treatment. These are seen in fewer than 10% of MMP cases and almost all are surgical wound infections that are managed medically with a short course of antibiotics. Less commonly, a deep infection will develop that requires a longer course of antibiotic or a second operation to remove some of the implants. Treatment of Major (medical) complications is almost always completely successful.

Major (surgical) complications

Major (surgical) complications are defined as those that resolve completely, but require an additional, unplanned operation – "revision surgery". Meniscal injury and tibial fracture account for almost all the Major (surgical) complications after MMP.

Meniscal injury

Meniscal injury describes damage to the small "cartilages" in the joint and although it is extremely common following CCL failure in dogs, it usually goes unnoticed. However in some dogs (about 4% of dogs in the first year and a further 1-2% of dogs in the second year after MMP surgery) it causes lameness. Some of these will recover in response to medical treatment alone but others will require a second operation before returning to pre injury levels of activity and athletic function.

Fracture

Fracture of the shaft of the tibia adjacent to the surgical site is perhaps the most serious complication of MMP surgery. The complication has been seen in fewer than 2% of dogs operated. Fractures occur within 3 weeks of surgery and almost always in dogs being allowed to exercise off the leash (contrary to the after-care instructions!) Although classified as "Major (surgical)" complications, about half these fractures will be treated successfully without the need for another operation.

For those dogs that need revision surgery, in most cases the operation is relatively straight forward and only very occasionally is a major revision procedure necessary.

Catastrophic complications

Catastrophic complications are defined as those that despite the best medical and surgical efforts, result in failure. Catastrophic complication has been encountered in fewer than 0.5% of dogs operated with MMP.

The data used to compile these estimates is drawn from several sources including, Ness, Midgely and Harms (2012) *A review of 131 dogs with lameness due to CCL failure treated with MMP*. Veterinary Orthopaedic Society Annual Conference, Crested Butte, Co., USA. Kapler, Marcellin-Little and Roe (2015). *Planned wedge size compared to achieved advancement in dogs undergoing the modified Maquet procedure*.VCOT 2015;28(6):379-384 and Ness (2016). *The Modified Maquet Procedure (MMP) in Dogs: Technical Development and Initial Clinical Experience*. JAAHA 2016;52(4):242-250.

Which operation?

Many different surgical techniques exist to treat dogs with CCL failure but remarkably few of these have been subject to proper review and reported in the veterinary literature.

The good quality, well-controlled, prospective clinical trials and investigations necessary to establish the relative merits of each different CCL operation have not been performed and consequently, there remains considerable controversy about the absolute or relative merits of the range of currently used CCL operations.

Several different kinds of operation have been tried to treat the lameness caused by CCL failure:

1 Extra-articular “stabilisations”

A synthetic material is placed outside the stifle (knee) and anchored to the bones on either side of the joint. A wide variety of fixation methods and locations are employed. The aim is to stabilise the joint against abnormal/excessive movement while preserving all other motion.

2 Ligament replacement techniques

A prosthetic ligament, which might be of synthetic material; a “graft” of, for example, patellar ligament taken from the same dog; or an allograft (tissue harvested, post mortem, from another dog), is placed within the stifle joint anchored to the bones above and below the joint.

3 Tibial Osteotomy (bone-cutting)

These operations aim to change the mechanics of the joint by altering the shape of the tibia. Tibial plateau levelling ostetomy (TPLO) was developed by Drs Slocum and Devine in Oregon, USA, during the 1980s and tibial tuberosity advancement (TTA), was described by Drs Montavon, Damur and Tepic in Switzerland in 2002 - MMP has evolved from this original Swiss operation. The precise mechanism by which TPLO and TTA work is certainly very complex and remains poorly understood. It is now widely accepted that the tibial osteotomy (bone-cutting) operations offer the best chance of a return to pre injury levels of athletic activity, especially in larger or more active dogs. However, the original TPLO and TTA techniques are complex and costly.

Orthomed started work on developing MMP in 2005.

A detailed and exhaustive design, development and modelling phase was followed by carefully monitored testing and evaluation.

Next, the technique was trialled on a small number of pet dogs that, like your dog, had lameness caused by CCL failure. These dogs were monitored carefully by clinical and X ray examinations over several months: the owners provided valuable information about their pets' recovery and convalescence.

The success of that first phase of clinical evaluation led to a second phase involving seven veterinary surgeons at three hospitals operating on more than one hundred and fifty dogs. After review of those cases, the technique was disseminated through teaching veterinary surgeons in primary care practice, surgical referral practice and veterinary teaching universities internationally. That process started in 2009 and is ongoing.

The MMP technique uses a wedge shaped implant of titanium foam (a modern bio-material developed by the National Research Council of Canada) and has found widespread popularity across the world with 30,000 dogs successfully treated (Spring 2016) in more than 400 centres in the UK, Germany, France, Scandinavia, USA, Canada, Australia and New Zealand.

The surgery is technically less challenging and less invasive than conventional TTA or TPLO, it takes less time and the use of carefully designed instrumentation controls variation and minimises the risk of complication.

More than 30,000 dogs have been successfully treated with MMP

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Which surgeon?

No matter where you live in the world, veterinary surgery - whether a minor wound repair or a more complex orthopaedic operation like MMP - can only ever be performed by a qualified Veterinarian.

General veterinary practitioners at their home practice perform most veterinary surgery. However, a small number of veterinarians have chosen to specialise in surgery and undertake a demanding four years post-graduate training programme to be “Board Certified”.

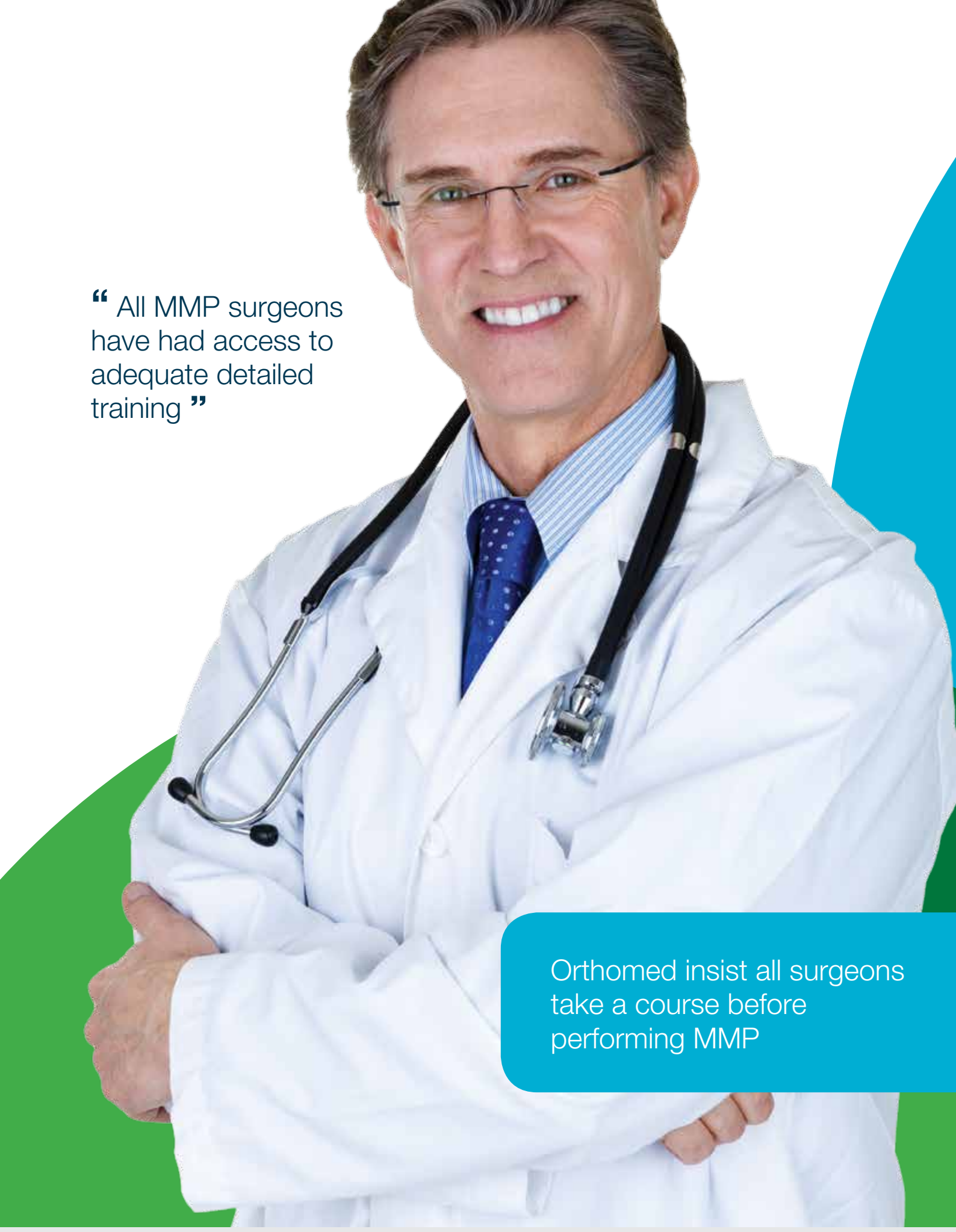
These veterinary surgeons are recognised by, for example the DECVS or DACVS letters after their name, which stand for Diplomate of the European/ American College of Veterinary Surgeons. Most of these Diplomate surgeons work in referral hospitals and spend most of their time dealing with more complex and challenging cases.

While MMP is the choice of many Specialist Diplomate surgeons, it is also offered by many experienced veterinarians in primary care veterinary practice.

Orthomed is a dedicated veterinary orthopaedics company that exists to develop and improve orthopaedic surgical techniques then disseminate them through hands-on practical training and ongoing technical and professional support. Surgeon training is at the heart of that ethos.

Orthomed is unusual, perhaps even unique amongst veterinary implant providers in insisting that any veterinarian who wants to perform MMP, first attends a technique-specific training course – that rule applies equally to a general practitioner or an experienced Diplomate.

This regimen ensures that all MMP surgeons have had access to adequate detailed training and exposure to the accumulated knowledge and experience of the surgeons who developed and continue to use the technique.

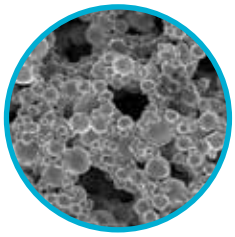


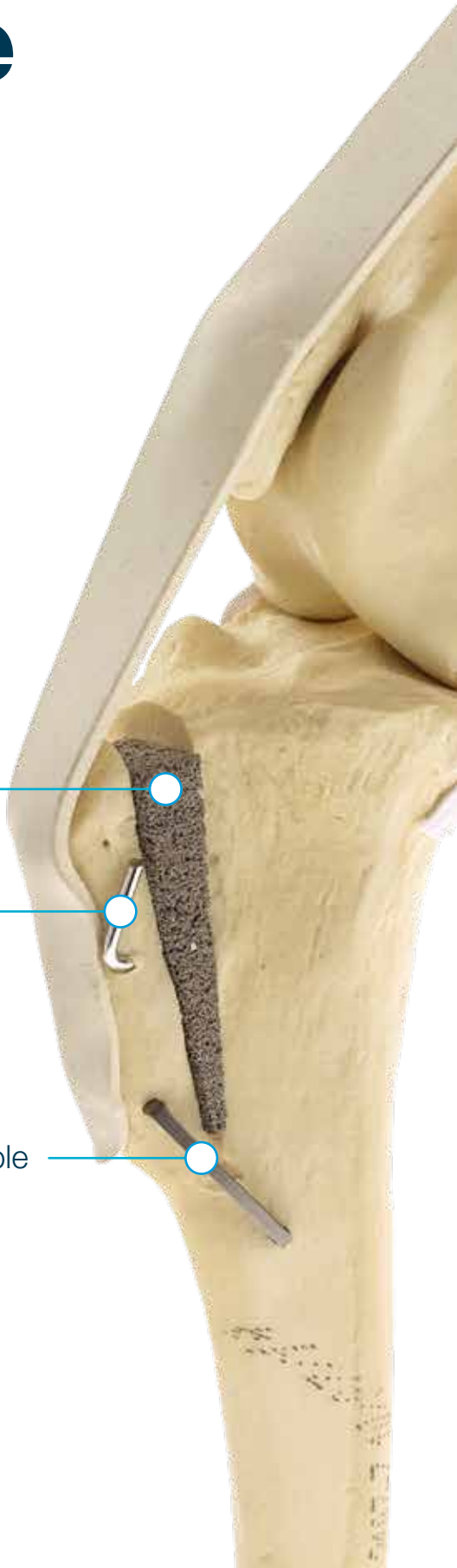
“ All MMP surgeons have had access to adequate detailed training ”

Orthomed insist all surgeons take a course before performing MMP

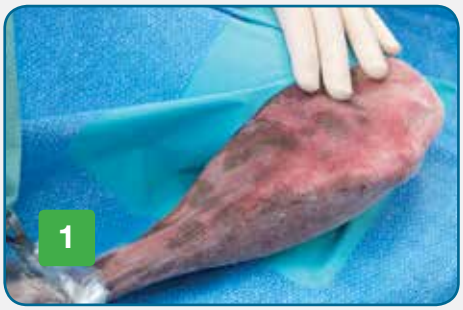
What does the operation involve?

MMP is performed under general anaesthetic.





A wedge-shaped implant made from titanium foam is placed behind the point of the knee.



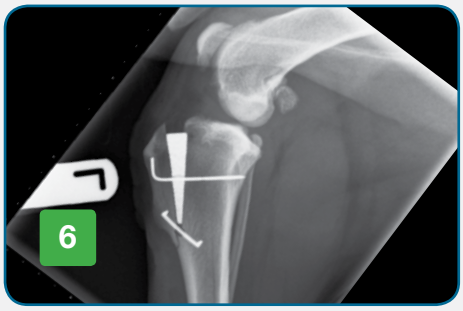
In preparing for surgery, the hair is clipped away from a wide area and the skin is thoroughly cleaned.

The operation is performed through a surgical incision about ten centimetres long made on the inside of the patient's stifle (knee).

An osteotomy (cut in the bone) is made at the top of the tibia (the shin bone) just behind the tibial tuberosity (the "point" of the knee) and the cut bone is hinged forwards.

A wedge-shaped implant made from titanium foam is placed behind the tibial tuberosity to hold it in the "hinged-forwards" position.

A bone staple and pin are used to secure things in position before the surgical wound is repaired using several layers of sutures.



Following surgery, X ray pictures will be taken to confirm that everything has gone to plan before the patient is allowed to recover from anesthesia.

How quickly will my dog improve?

Although it's not unusual for dogs to "carry" their leg for a day or two after MMP, most dogs will start to weight-bear tentatively on the operated leg straight away.

2 days

Weight Bearing

Within two days of surgery the patient should be weight-bearing while walking

2 weeks

Increasing Confidence

By two weeks after MMP surgery, patients should be using the operated limb with increasing confidence. Although the dog will still be noticeably lame, the dog will be using the operated leg at every step.

4 weeks

Walking Strongly

By four weeks after surgery, although lameness will still be seen, the dog will be walking quite strongly on the operated limb.

Full activity with unrestricted off-leash exercise is expected by

8-10 weeks

4-6 weeks

8-10 weeks

6 months

X-Rays Taken

Check X rays are usually taken four to six weeks after MMP surgery then activity levels are gradually increased back to normal.

Full Activity

Full activity with unrestricted off-leash exercise is expected by eight to ten weeks after surgery though some morning stiffness and mild lameness can still be seen at this stage.

Best Improvement

The “time to best improvement” is approximately six months after surgery. Dogs that encounter complications will recover more slowly.

What do I do after the operation?

The importance of the owners' involvement in patient care after MMP surgery cannot be exaggerated.

If you look back at the information about complications, you will see that the two most common significant complications of MMP (complications that might require revision surgery and could result in a poor outcome) are lameness caused by ***meniscal injury*** and ***fracture of the shaft of the tibia***.

While there is little, if anything, that either the surgeon or the dog's owner can do to influence the risk of meniscal injury, the opposite is true of tibial fracture. Review of data supplied by surgeons to Orthomed reveals some very interesting information.

From the first 20,000 MMP cases, we received reports of 71 tibial fractures (0.36%). All of these fractures occurred within three weeks of surgery (before the bone has had time to heal and remodel) but of most interest was the fact that 67/71 (94%) of owners reported that the fracture occurred while the dog was exercising off the leash – against the advice given in the after-care instructions.

94% of fractures occurred while the dog was exercising off the leash (against the advice given).

It is, therefore essential that following MMP surgery all dogs are kept on a leash – no matter how well they are doing – until after the check x-rays four to six weeks after surgery.

“ Out of the first 20,000 cases veterinary surgeons reported a total of 71 tibial fractures. 67 (94%) dogs sustained their fracture while exercising off the leash, their owners choosing to disregard the important advice given in the MMP aftercare instructions.) ”

All dogs must be kept on a leash for at least **4 weeks**

After-care Instructions

Although the patient may appear surprisingly ‘bright and bouncy’ soon after the operation, don’t be misled:

Your dog has had major orthopaedic surgery involving, bone-cutting, metallic implants and more.

Days **1-3**

5 Minute Leash Walks

Short (up to 5 minutes), frequent (up to 20 times a day) leash walks. Early activity is beneficial so please do not completely rest your dog. Check the surgical wound at least twice a day. The wound may be a little swollen and bruised but it should be dry and clean. Your dog must not be allowed to lick at the wound.

Days **4-14**

20 Minute Leash Walks

Increasingly long (up to 20 minutes) walks on the leash as often as you wish providing the dog is not becoming tired. By now the operated limb should be in use at almost every step – if that is not the case, contact your veterinary surgeon. Resist the temptation to let your dog off the leash, for example to toilet. This phase of the recovery is crucial – the patient is starting to forget their surgery but the bone is still far from healing. Skin sutures are removed ten to fourteen days after the operation.

Days **14-28**

20 Minute + Leash Walks

Continue to increase the distance and duration of leash walks to fit in with your normal routine. Towards the end of this phase, your dog will be using the operated limb at all times and although some stiffness and lameness will still be present, these will be obviously improving over time. No matter how well your dog is improving, resist any temptation to let them off the leash – even “just for a few minutes”. Check X rays will be scheduled between four and six weeks after MMP surgery.

Days **28-56**

3-6 months

Gradually Introduce Off-Leash Walks

Gradually increasing activity back to normal. Once the check X rays have confirmed that bone healing is progressing normally, you can start to let your dog off the leash.

To start with, allow a short period of off-leash exercise in a quiet place (away from other dogs and similar excitements or distractions!) and do this perhaps at the end of the last walk of the day when the patient is likely to be a little calmer and more settled.

After that, you can gradually increase the frequency and duration of free-running exercise such that by the end of this phase, that is eight weeks after MMP surgery, your dog is exercising without restriction.

It is normal for there to be some stiffness after rest and minor lameness at this stage, indeed you might have noticed your dog becoming transiently more lame as exercise and activity increased.

Heading back to Normal

During this phase we expect to see the persisting stiffness after rest and lameness to decrease and in most cases disappear.

Medication

Typically, MMP patients are given peri-operative antibiotics and a longer course of non-steroidal anti-inflammatory medication (NSAID) – lasting four weeks or more.