



# CASE STUDY

Advanced Imaging without CT

Adaptix use cases in an orthopaedic setting

Dr Padraig Egan

## The Vet

Dr Padraig Egan is the Clinical Director at East Neuk Veterinary Clinic. Having worked in mixed practice and at Fitzpatrick referrals, he achieved his ECVS Surgical Diploma as an EBVS® European Specialist in Small Animal Surgery and RCVS Specialist in Small Animal Surgery. His clinical interests lie in the management of canine elbow disease and feline trauma. He can't resist a new gadget to support his clinical practice.



## Background

Padraig's caseload consists predominantly of orthopaedics—averaging 12 - 15 primary orthopaedic cases per week. The clinic itself also undertakes general surgery, including regular dental procedures.

Handling a large caseload, Padraig and his team spend a lot of time in their imaging suite. They have a standard 2D radiography unit and a CT scanner.

"We needed a halfway house between 2D x-ray and CT. That's where Adaptix came in."

After being introduced to the Adaptix technology at BSAVA Congress, Padraig was keen to get a unit in his clinic and has now had it for 12 weeks.

During this Webinar Vet session, he explains the cases he is using it for, the learnings he and his team have made, and the perfect niche that Adaptix fills in both his referral and first opinion practice.





# Adaptix Digital Tomosynthesis—in clinic

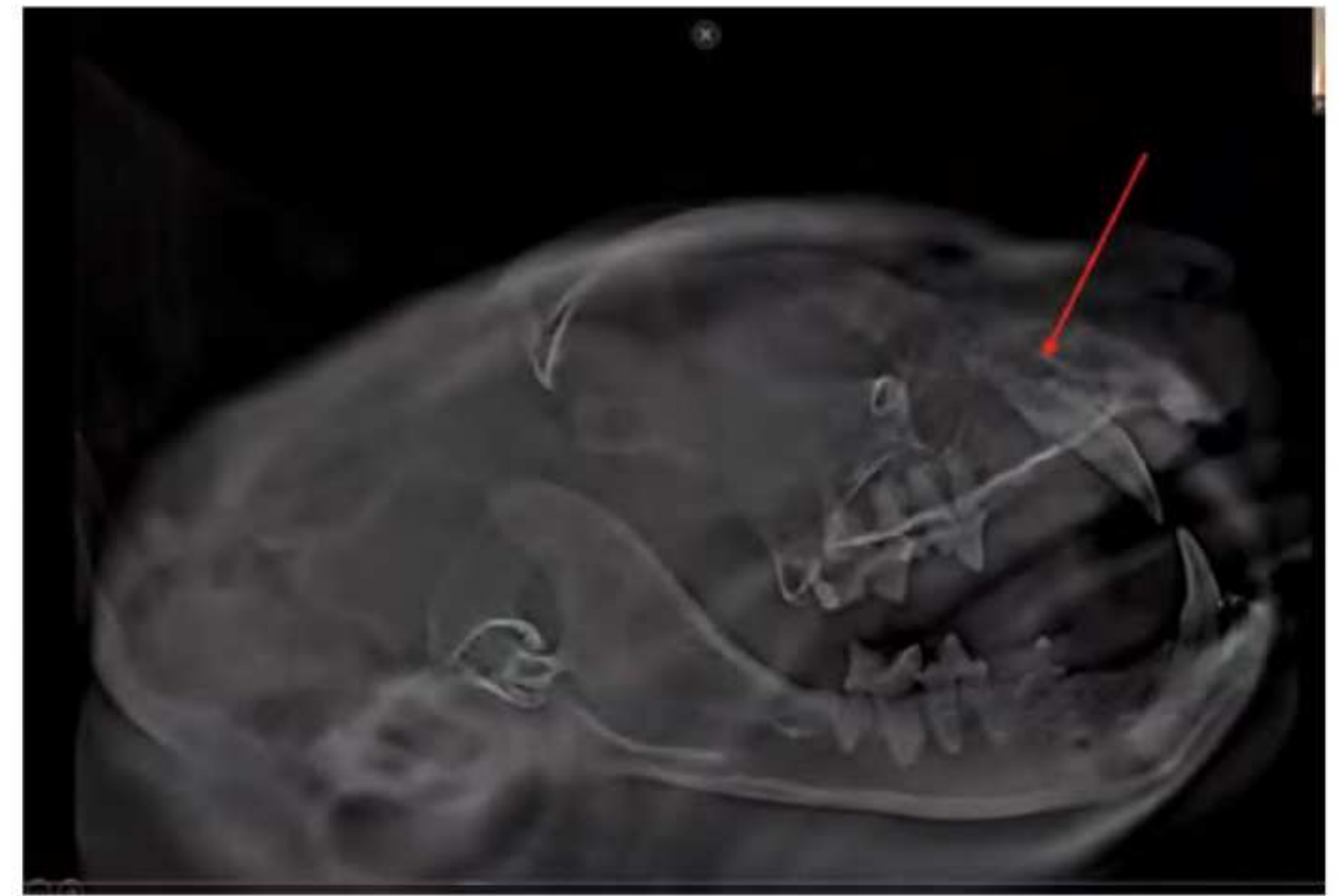
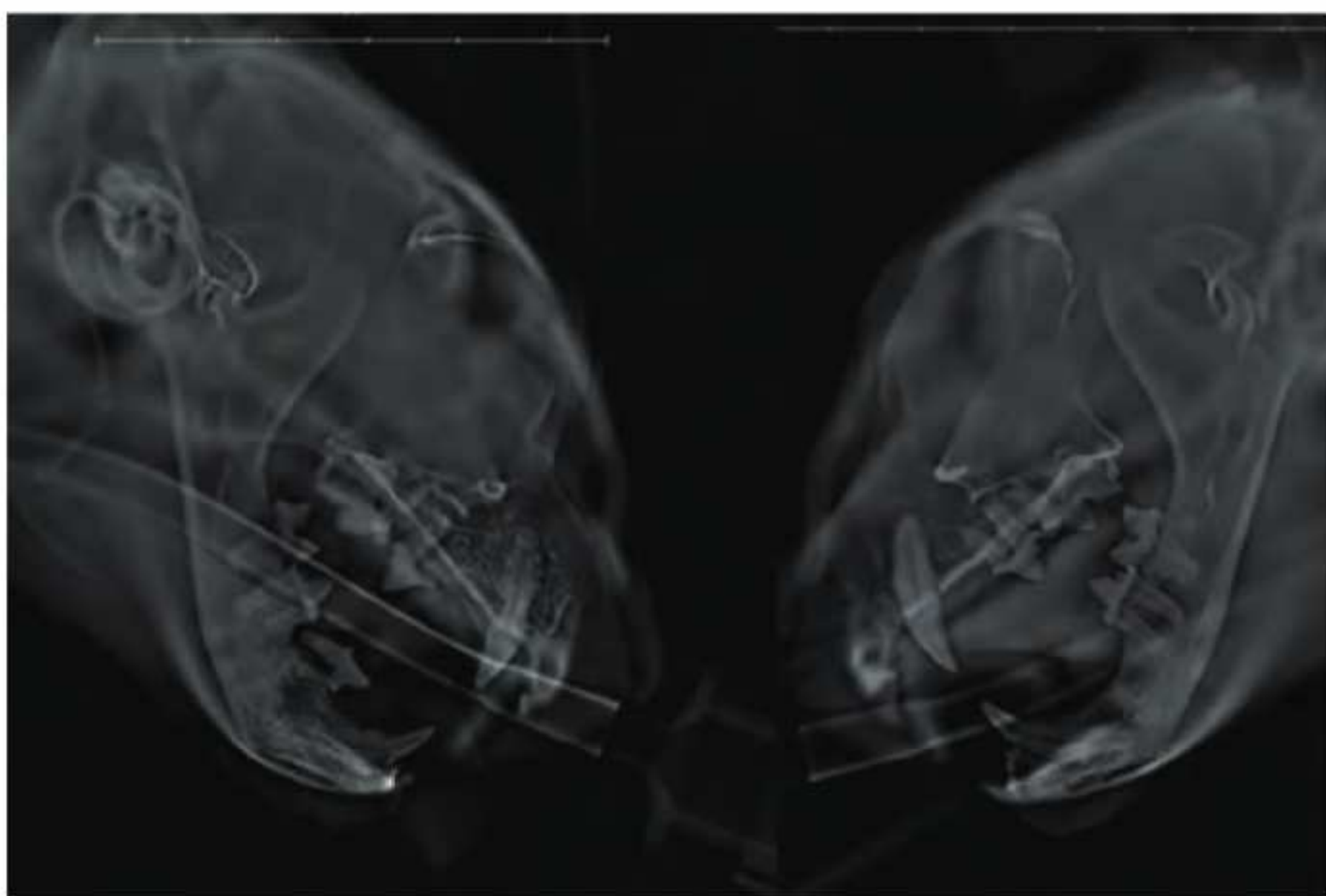
Even though Padraig is still in the infancy of his testing period with the Adaptix machine, he is already developing his usage of digital tomosynthesis in his day-to-day work. He believes it may replace his usage of 2D radiography in cases, particularly in dental work. It fits a niche between x-ray and CT that enables better diagnostic decision-making whilst reducing the radiation his patients are exposed to, compared to CT.

## Dental and Skull imaging

*“The imaging that’s produced by the Adaptix system is pretty beautiful.”*

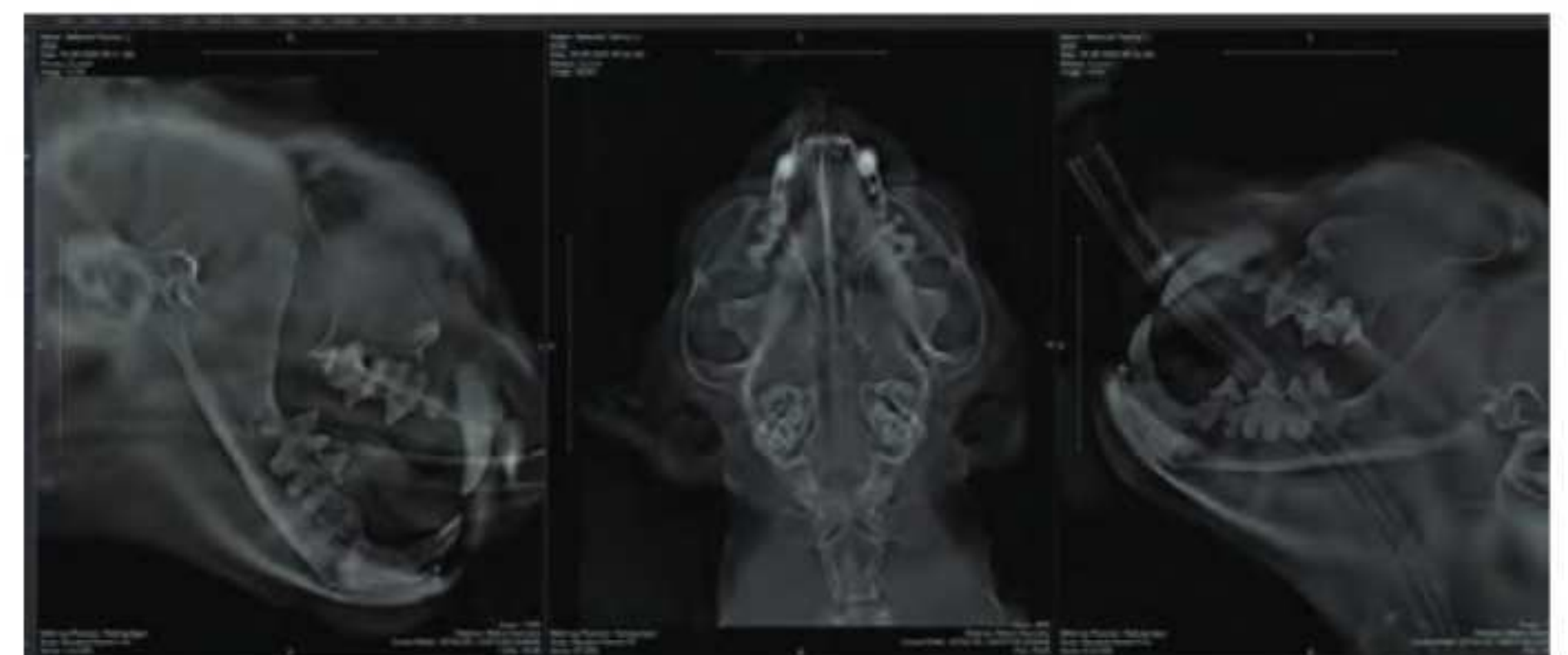
In general, Padraig’s team take dental images dorsoventrally and right and left lateral views. All structures in the skull can be easily identified throughout the 3D stack of images the Adaptix system delivers, and is particularly useful for identifying feline tooth resorption and TMJ fractures. Tooth resorption affects 20-60% of all cats and almost 75% of cats over 5 years old.

Identifying this early will enable quick treatment, resolving the issue and preventing unnecessary dental pain.<sup>1,2</sup>



“Most people would assume that CT is the modality of choice for assessing tooth resorption, but the sensitivity is pretty low (around 42-57%). The specificity is good, it can rule it out, but it can also miss it due to poor spatial resolution in cats. The Adaptix machine offers a much higher spatial resolution.”

Time under anaesthesia is of concern, particularly in cats, and Padraig’s team is finding that the time taken to image patients reduces drastically using the Adaptix machine. The images are ready to view within two minutes after taking the left and right lateral acquisitions. During that time, they scale and polish before assessing the stack of images for pathologies.



Padraig notes that the dorsoventral views deliver detailed views of the nasal cavity, the turbinates within it, and the middle and inner ear. This level of detailing is beneficial in cases such as cats with polyp disease and for assessing bulla pathology and the completeness of the bulla osteotomy.



<sup>1</sup> <https://www.vet.cornell.edu/departments-centers-and-institutes/cornell-feline-health-center/health-information/feline-health-topics/tooth-resorption>

<sup>2</sup> <https://journals.sagepub.com/doi/full/10.1177/1098612X14560098>





## Developmental Elbow Disease

Management of Canine Elbow Disease is one of Padraig's clinical specialities. During the infancy of their time with the Adaptix machine, their CT scanner was undergoing maintenance, so they were relying on the Adaptix machine completely as their diagnostic imaging tool.

### Periarticular Osteophytes

The results often need to be clearer and more accurate when assessing developmental elbow disease using 2D x-ray. Padraig and his team are looking for periarticular osteophytes and subtrochlea sclerosis. Moving through the stack of 3D images from the Adaptix machine, the joint, and associated pathologies are clearly visible. Padraig found that in many cases, the information gained from the Adaptix imaging prevented him from needing to undertake further, higher radiation imaging.



### Medial Coronoid Disease

Padraig undertakes imaging when assessing if potential medial coronoid disease cases warrant arthroscopy. 2D x-ray and CT are both sensitive, but 2D x-rays have low specificity. The data Padraig has gathered puts Adaptix in between the two, making it a very useful assessment tool with reduced radiation compared to CT.

## Coronoid fragmentation

Compared to CT, the Adaptix machine has the potential to identify coronoid fragmentation, which helps the surgeon move forward with focal treatment of the coronoid process.

### Growth Deformities

Although CT will likely remain the gold standard method for assessing growth deformities, particularly if you need a 3D model constructed, Padraig found the Adaptix imaging very useful. Using the images from the Adaptix machine, it was easy to identify a humeral-ulna incongruity, radial-ulna step, and coronoid distalisation in a recent short-ulna Syndrome case.

### Humeral Intracondylar Fissure

*"We see lots of Humeral Intracondylar Fissure here in Fife because everyone seems to own a Spaniel, with a rising number of cases in French Bulldogs."*

"We see lots of Humeral intercondylar Fissure here in Fife because everyone seems to own a Spaniel, with a rising number of cases in French Bulldogs. So we see related Lateral Condylar fractures and do a lot of work-ups for this condition."

Padraig is also seeing lots of incomplete humeral intercondylar fissures. If missed, it's the number one cause of fractures, and approximately 43% of cases will be contralateral. Adaptix imaging has enabled the identification of these cases, which can be difficult to identify using 2D X-rays. There





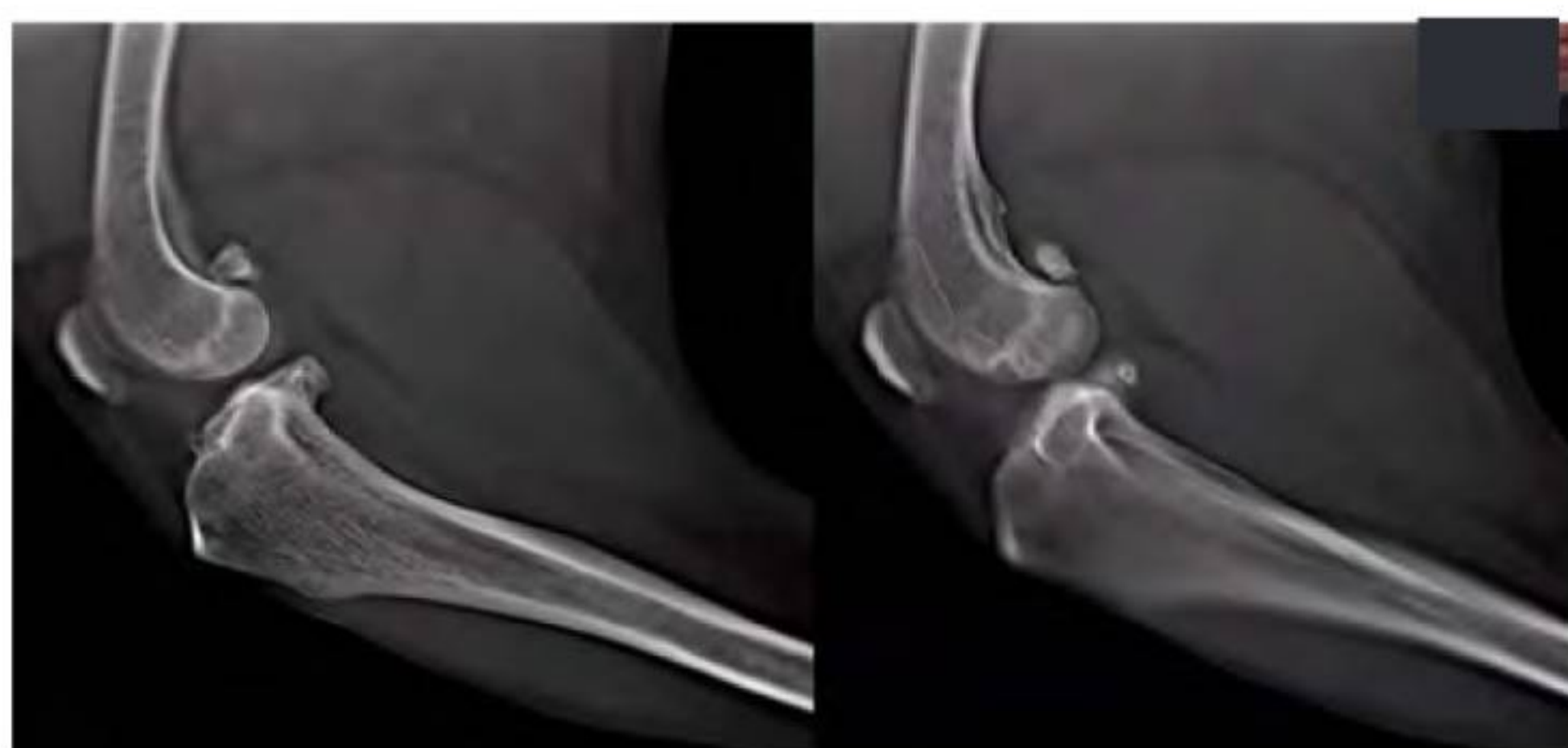


have even been identified in asymptomatic cases or those in their early stages. For asymptomatic cases the Apadtix 3D imaging enables the team to make decisions between conservative or surgical management.

*“Adaptix imaging is interesting here as it is particularly useful for those early in their careers or when new to assessing stifle pathology. The level of detail in the images is impressive.”*

## Cruciate disease

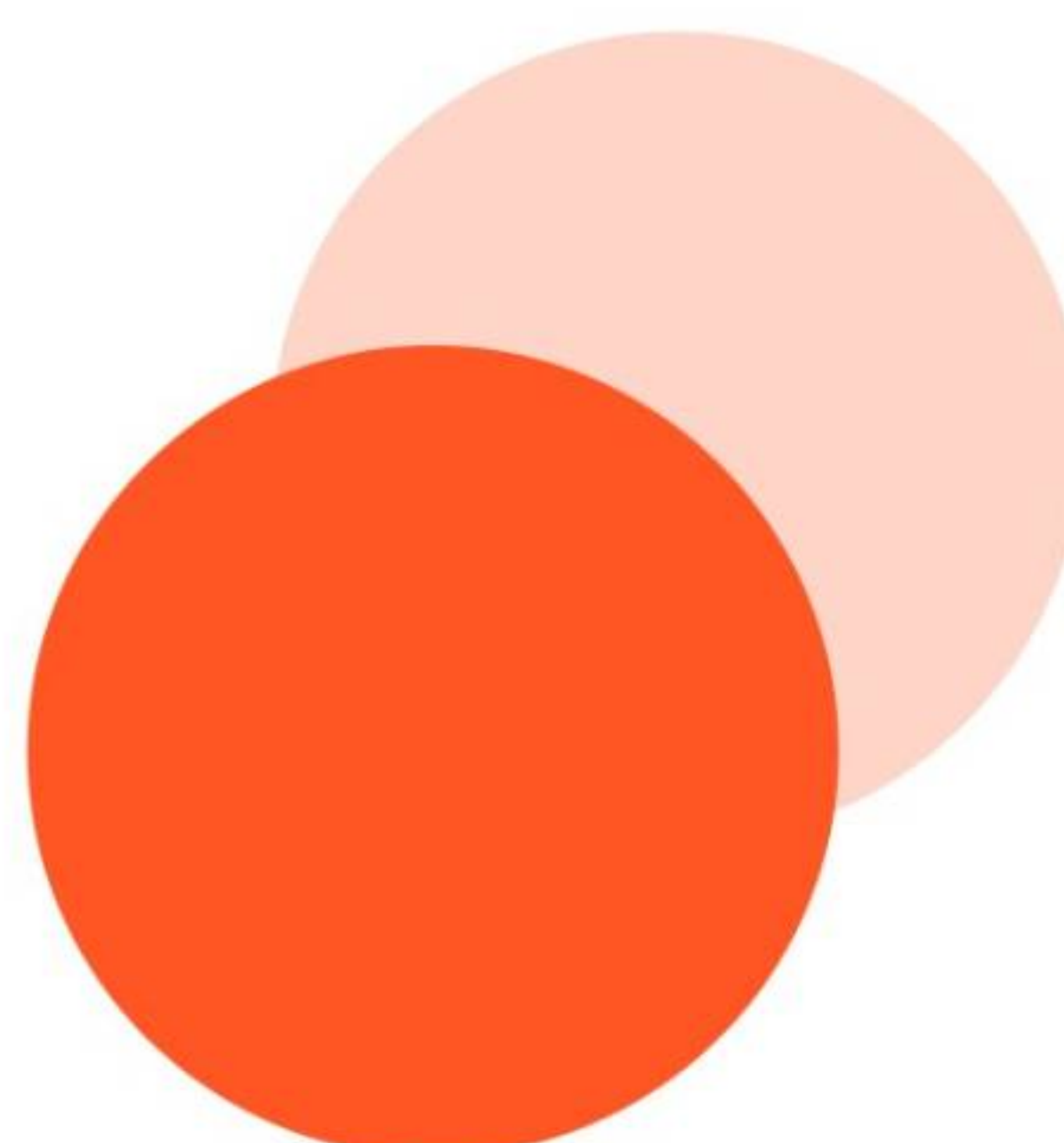
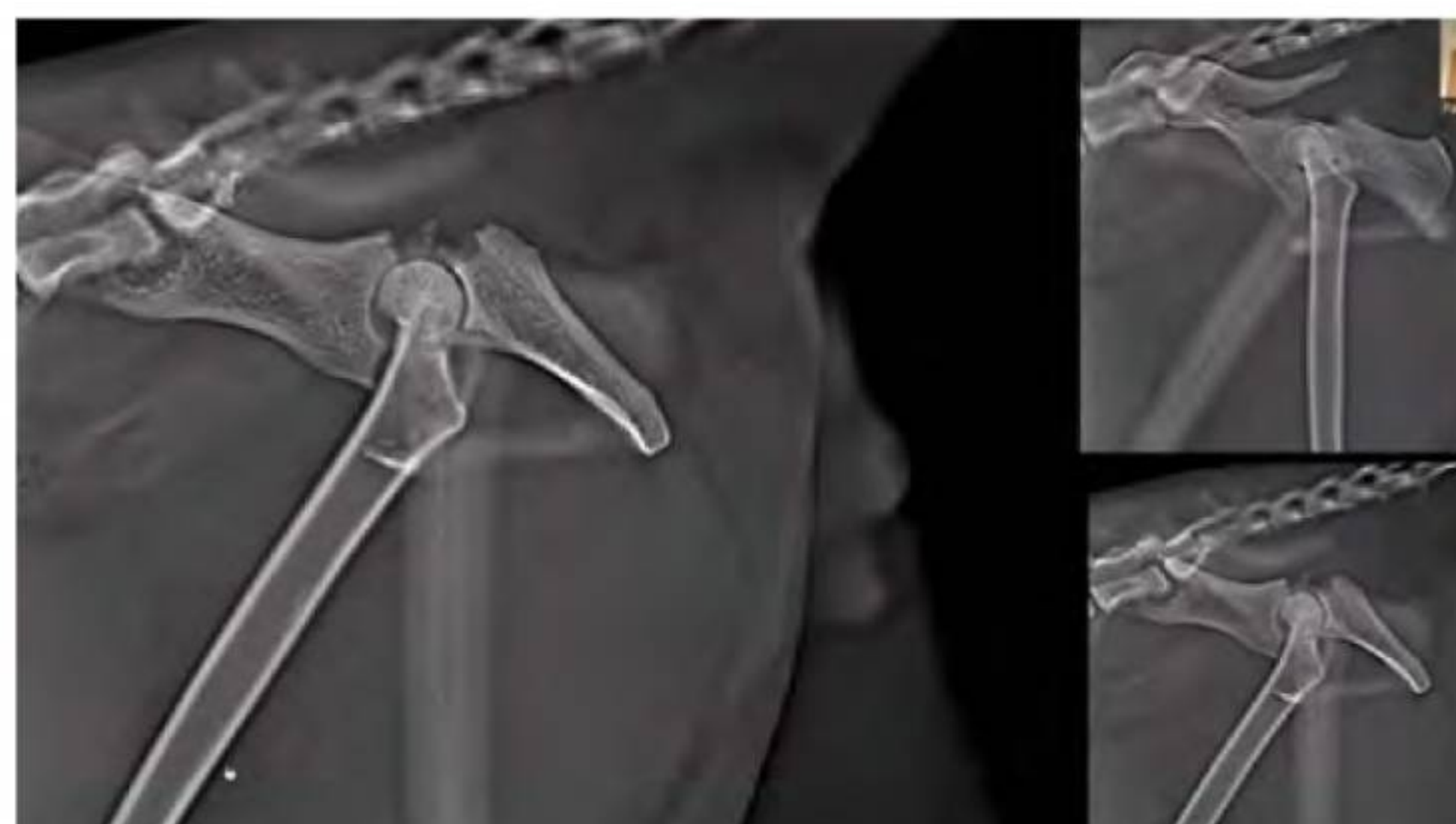
Imaging of pathology here enables easy identification of effusion, compression of the infrapatellar fat pad, and osteophyte progression, supporting the identification of early cruciate disease. The ease of interpretation of Adaptix images makes it particularly useful for those gaining confidence in imaging, or for when a second opinion within the clinic isn't possible.



When assessing osteotomy in TPLO cases, the Adaptix machine has reduced artefacts behind the plates compared to CT. In cases of osteotomy assessment, the level of radiation that comes with CT may not be appropriate, but Padraig is finding that Adaptix imaging is enabling clear assessment of osteotomy and remodelling at a significantly lower radiation dose.

## Fracture and Osteotomy assessment

Adaptix really comes into its own when assessing cat pelvis trauma. The imaging has supported Padraig and his team's decision-making, particularly when the spatial resolution of the CT scanner struggles with the small volume of the cat pelvis. The sensor area and the technology behind the digital tomosynthesis of Adaptix enable beautifully clear imaging in these circumstances and are particularly useful in cat-specific clinics.







## Learning the equipment

As with any new technology or tool, learning how to get the best from the Adaptix machine has taken Padraig and his team a little time. However, they are getting incredible results and beautiful images that support their diagnostic decision-making, despite only having the machine for 12 weeks. So, what have they learnt in that time?

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## Positioning

As with all veterinary imaging, positioning is key. Although more forgiving than 2D x-ray, getting the best images from the Adaptix machine still requires accurate patient positioning.

“What we are trying to do with this technology is expose our patients to less radiation to get the imaging done and dusted. So accurate positioning within the acquisition plane gets the specificity and sensitivity we want. Accurate positioning is the way forward”.

## Reading the image stacks

The image stack output from the Adaptix machine enables a 3D view through the image plane. One acquisition results in 50 slices through the area of interest. You can then scroll forwards and backwards through these, and zoom in and out, enabling you to study each area in turn. Areas of interest can be focused on, rotated, and measurements taken, enabling a detailed understanding of the issues highlighted for the best clinical outcomes.

Viewing these image stacks uses a similar skill set to interpreting CT scan images, and most clinicians adapt quickly.

“It takes time to gain the confidence and competency to assess patient images from the Adaptix machine. I move back and forth through the 3D stack of images—it's a skill you learn pretty quickly, though, and once you get the knack of it, it produces such nice images!”

## Success in real life

“We’ve been using the Adaptix Digital Tomosynthesis machine for 12 weeks. In dentistry, it’s completely changed our workflow. The team adores it! In orthopaedics, it bridges the gap between the two modalities of 2D x-ray and CT. Particularly in orthopaedic practice, it has a very high in-plane resolution.”

Padraig and his team have integrated the new Adaptix technology into their workflow, supporting their caseload and enabling high-quality diagnostic imaging at a lower radiation dose and cost than their CT scanner. It is supporting the clinic both in dentistry and orthopaedics, and Padraig can see their workflow evolving even further as their understanding of what this technology can do in their practice deepens.

## Why does Padraig think the Adaptix machine should be in all veterinary practices?

### Detailed analysis of bone structure

“It’s amazing to see the trabecular pattern in the level of accuracy in this imaging. From an orthopaedic point of view, we can learn an awful lot about what is going on by looking for subtle changes in the medullary canal. The Adaptix images give the level of detail to allow us to do this.”

### High Spatial Resolution and imaging of attenuating structures

“The Adaptix machine has a spatial resolution way higher than CT”

This high spatial resolution is particularly important in dentistry cat imaging. The imaging technology also means that images are clear, even when imaging highly attenuating structures such as metal, with limited artefacts obscuring the view.

### Reduced radiation

“We shouldn’t underestimate what the exposure to radiation does to our patients.”

The Adaptix machine requires no more radiation protection than for a standard 2D x-ray, and its dosage is around that of two single x-ray acquisi-





tions, leading to a stack of 50 image slices through the area of interest.

A CT scan results in significantly greater radiation exposure in comparison to Adaptix imaging, which is similar to that of a standard 2D x-ray. A fully purpose-built CT room with all the associated protection is also required for an in-house CT scanner. The reduction in radiation and required protection for detailed 3D imaging makes the Adaptix machine useful for in-clinic assessment, reducing the need to refer patients away from your clinic.

#### Lower machine costs.

“I’m currently looking to buy a new CT machine, and it’s roughly the price of a house! For a practice without the finances or the space for CT, the Adaptix machine gives you that bridge between standard 2D x-ray and CT.”

#### Lower structural costs

It is possible to locate the Adaptix machine anywhere within the practice, and most clinics house it within their current x-ray room. It works from a standard plug socket and negates the need for a three-phase power supply. Unlike a CT scanner, no extra structural or building costs are associated with implementing an Adaptix machine in your clinic. There is no requirement for high-level radiation protection or heat systems as well—assuming safe radiation protection conditions are maintained in accordance with Radiation Protection Advisor guidance.



**“Every practice is different. Everyone has a different caseload. But I think Adaptix is a technology that is opening up new avenues of diagnostics and treatment for lower costs, at a time when costs are affecting all practices and clients. This bridge between digital radiography and CT is an avenue that will help both your patients and clients.”**



## About Adaptix Ltd

Adaptix Limited is transforming radiology through the development of innovative 3D imaging technologies that are significantly better, safer, smaller, and more affordable than traditional radiology systems.

Adaptix offer a very compact, light-weight and low-dose Vet 3D X-ray dental and orthopaedic imaging system that can be installed in an existing radiology room.

Adaptix’s central mission is to transform radiology by offering affordable low-dose 3D imaging at the point-of-care and allowing “3D-first” as the standard of care.

