## Introduction to the study *“Outcome of peripheral intravenous catheter fracture in dogs”*

The primary aim of our study is to describe the outcomes and complication rates of dogs with embolized peripheral intravenous catheter fragments, both in cases managed conservatively or surgically.

The fracture and migration of peripheral intravenous catheters is a complication that has been rarely documented in veterinary medicine. This fracture can occur during the implantation or during the catheter explanation, due to pinch-off syndrome, catheter injury, disconnection, or rupture. The migration of the fragment can cause sequelae that have been amply described in human literature, with a global mortality rate of 1,8% and a higher morbidity when the fragments lodge in the right cardiac chambers, followed by those located in the pulmonary arteries, in the vena cava and in peripheral veins. However, these can also remain asymptomatic and undiagnosed for prolonged periods in humans [1] [2]

After the fracture it is important to locate the missing fragment, and currently, the literature reports the use of radiography, fluoroscopy, ultrasound and computer tomography to identify its position [3] [4] [5] [6]

Indications for the removal of these foreign bodies are still debated, as there are case reports of long-term catheter fragments in asymptomatic humans [2], but also reports of life-threatening complications in the human literature [1], leading to the current recommendation in human medicine to assess each clinical case individually [7]

Criteria for patient selection for removal of an intravascular foreign body in veterinary medicine are difficult to establish because the complication rate in animals that do not undergo foreign body removal has not been determined. That is why it would appear reasonable to recommend retrieval in patients with concurrent systemic diseases that predispose them to hypercoagulable states, cardiac arrhythmias, or immunosuppressive conditions due to the complications reported in the human literature. [8]

The best treatment option in human medicine is percutaneous intervention for removal of fragmented intravenous catheters located in central blood vessels, as it is a minimally invasive procedure with low complication rates [8] [7] [9] In veterinary medicine this method has been reported as feasible as long as the animal size is small enough to perform fluoroscopy [8] although there are no reports of this approach in human beings of less than 800 grams [10] so the size limitation in small animals is unclear. Currently, the most described technique for removal of catheter fragments located in peripheral veins in dogs is the venotomy [12] [13] [14]

Our aim is to develop a multicentre, retrospective, observational study of patients that were presented with peripheral intravenous catheter fracture and were either managed conservatively or treated with surgical removal.

The collaborators will contribute through the recruitment of cases and collection of data and will receive a form to be filled with their details, the details of the information that they will provide to the study, a statement of confirmation of understanding of the study, and a statement of confirmation of agreement to adhere to data protection requirements and name of designated data controller. Also, they will have copies of the approved application protocols and any amendment necessary.

Medical records of participating referral centres will be searched to identify dogs that were referred for peripheral intravenous catheter fracture between 2000 and the end of the study.

Dogs will be included in the study if the medical records are complete with sufficient description of the location of the peripheral intravenous catheter fragment. Dogs will be excluded if despite a strong suspicion of a peripheral intravenous catheter fracture the owner declined investigation and the presence of a catheter fragment could not be confirmed.

The following information will be collected from the medical records, and based on owner follow-up (please see attached owner questionnaire) if not enough information is available:

- Patient details at the time of the diagnosis: breed, sex, body weight, age, concurrent pathologies, clinical signalment

- Catheter used and length of use

- Location of catheter placement before the fracture

- Suspected reason for fracture

- Time for fracture noticed to referral presentation

- Imaging method used for locating the fragment

- Location of the fragment

- Treatment (surgical, minimally invasive or conservative) and details of treatment

- Short term complications (Y/N) and type

- Follow-up time

- Follow up imaging performed (Y/N) and details

- Further treatment required (Y/N) and details

- Long-term complications of catheter fracture (Y/N) and details

#### Data collection

We will use anonymized clinical data stored in the medical records of the patients and the results of owner questionnaire. This will be reviewed by the collaborators in the different participant hospitals, and only current workers involved in the surgery department will be involved. These collaborators will process the information recorded in their updated clinical records and when necessary, contact owners that have already given previous consent to be contacted for research purposes.

All the owners contacted will receive an information and consent form and a short questionnaire to complete the data collection.

Also, they should be aware that only the anonymised clinical data will be stored for the purposes of the research and sent to the main author. No personal details will be shared with the main author.

#### Process of obtaining the research information

At each referral centre, data will be obtained by one investigator who would have access to the patient management system of this centre. The investigators will search their practice clinical database by medical key words, identify cases that meet the study inclusion criteria, extrapolate the pet data required for the study, contact the owners to obtain consent, and use the questionnaire form to complete the data. The anonymized data will then be collated on a spreadsheet which will be sent to the main investigator (Ana Blanco Perez).

 An ID code will be created for each patient in each centre, so no personal information will be shared.

Also, the spreadsheet will be password protected and stored on password protected computers. When sharing between investigators, secure workplace email will be used.

#### Owner concerns

When contacting an owner, the questions may cause upset if the pet has already died or developed a major complication secondary to the presence of a fragmented catheter. Additionally, questions may cause concern for the pet´s current health, as we will be enquiring about any further follow ups after the diagnosis.

Should any owner be concerned about their pet´s health, a revision appointment would be recommended with their primary practice or in the collaborating referral centre.

#### Sensitive information

Client data and pet names will not be stored outside of their respective referral centres.

The IDs used to identify cases will be deleted from the spreadsheet after 3 years, so the storage data will be fully anonymized.

The consent for been contacted for research purposes should be stored in the management system of the collaborating centres.

The consent for participating in this research project will be given verbally by phone, by email or by post. A note will be made in the management system of the collaborating centres and no paper copies will be stored.

Any paper copy of the questionnaire, if the owners are contacted by post, will be shredded once the data is scanned and attached to the management system of the collaborating centres.

Any email with a copy of the questionnaire will be deleted once the information is attached to the management system of the collaborating centres.

Only the datasheet with the results will be shared with the main author.

This datasheet will be stored indefinitely for good research practice.

*If you wish to request more information about our study or have any questions, please feel free to contact the main researcher (**Ana.Blancoperez@willows.uk.net**) or the main co-author (**Erika.Villedieu@willows.uk.net**)*

*If you wish to raise any concern regarding this study, please feel free to contact Willow´s hospital director Tom Reilly (**tom.reilly@willows.uk.net* *)*