

## Retrieval of an Intravascular Catheter Tip Fracture in a Dog

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**Abstract :** An intravenous foreign body was retrieved from a 10-year-old Maltese. A 24 gauze of fracture intravenous (IV) catheter moved into the circulation to a Maltese (3.4 kg) dog through the upper cephalic vein. Radiography was performed to observe the fracture's moving path, followed by fluid therapy. It was found in the upper cephalic vein, moved about 10 cm up to dorsal and near the proximal humerus. Retrieval surgery was performed successfully without complications. The catheter fracture retrieval sometimes remains a challenge because of unknown complications in veterinary medicine. This case report describes that a fracture IV catheter moved to the systemic vein was removed successfully by a surgery.

**Key words :** intravenous foreign body, retrieval surgery, embolization, dog.

### Introduction

An intravascular (IV) catheter is mainly used for administration of fluids and medications. The IV catheter fractures can occur in veterinary clinics as well as human medicine. IV catheter fracture occurs because of manufacturing defects, device mishandling, and forced elimination (1). In veterinary medicine, a fracture IV catheter is rarely reported even though the IV catheter injection is routinely performed. The incidence is considered unexpected depending on species, even between in humans and canines. This article is a contemplation of the incidence in terms of diagnosis and treatment with emergency internal veterinary care.

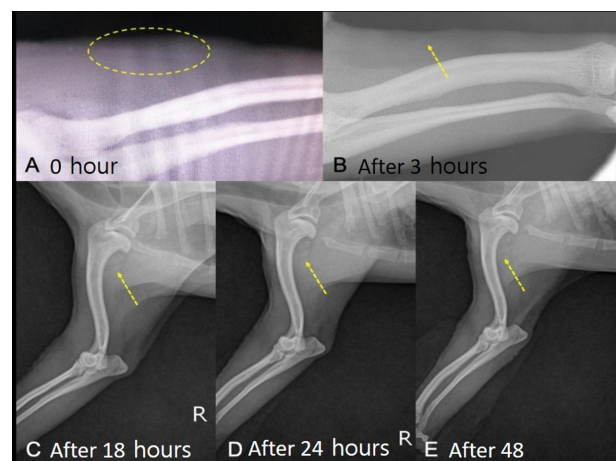
In human medicinal cases, the fracture can move around through the vessels and take to months to find (2). Catheter fractures have been found inside the peripheral branch of the pulmonary artery. In some cases, the fractures have moved up to the coronary sinus or pulmonary vein in humans (2-4). However, the potential complications from catheter fracture in veins are not mentioned nor studied in veterinary medicine. Compared to human medicine, venous catheter embolization is rare but a potentially serious complication of catheter placement (5).

This case report describes the clinical management of an intravenous catheter fracture in veterinary medicine without complications.

### Case Description

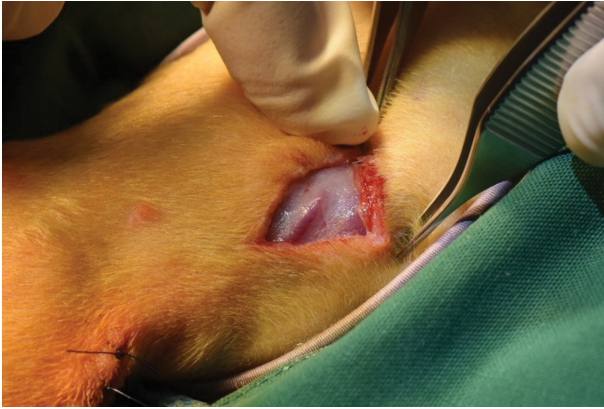
A 10-year-old spayed female Maltese weighing 3.4 kg diagnosed with hyperadrenocorticism, was referred for foreign body retrieval of a fractured cannula from an intravenous

catheter (24G) placed in the right cephalic vein during a clinical procedure. While removing the catheter with scissors, the cannula was accidentally cut. Topical radiography consultation for retrieval surgery was immediately performed and the fracture's position in an accessory cephalic vein was confirmed at that time (Fig 1A). However, the dog showed clinically unstable due to his underlying disease (hyperadrenocorticism) showing hypertension, so she was not eligible for anesthesia on that day. The dog had remained monitoring with fluid therapy with an anti-hypertensive drug (amlodipine 0.3 mg/kg, po, bid, Novarsc<sup>®</sup>, Pfizer, NY, USA) until the next morning for 8 hours. The right arm was bandaged to fix



**Fig 1.** A) Day 1: the mediolateral radiograph of the right radius confirming the position of the fracture. The fracture was placed on the antebrachium. B) Day 1 after 3-hour: the mediolateral radiography of the right radius. C) Day 2, after 18 hours later: mediolateral projection of the elbow, reposition confirmed. D) Day 2, after 24 hours later: mediolateral projection, steady position confirmed. E) Day 3, after 48 hours later: mediolateral projection, the fracture was seemed to be fixed the position.

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**Fig 2.** The small skin incision made in right humerus with left lateral recumbency. The fracture was found in the axillobrachial vein placed between triceps and deltoid muscle.

the position of the catheter in place temporarily (Fig 1B).

The following morning, the patient showed stable blood pressure, heart rate, and body temperature. Before the surgery, radiography was performed and confirmed that the location of the fracture was repositioned to the upper arm. Although the retrieval surgery was planned to cut 5 cm-long incision from the palpate along the cephalic vein, the fracture could not be found at that moment on radiology. The fractured catheter moved up to the proximal end of the right humerus, about 10 cm from where it was confirmed the previous day (Fig 1C). Considering not settled movement of the fragment, the surgery was postponed. Forty eight hour later from the event, the fragment did not seem to move further from the position confirmed in the upper arm (Fig 1D, 1E), which was between the triceps and the deltoid muscle. Consequently, the retrieval surgery was performed with an incision on the cephalic vein near the right axilla.

The dog was premedicated before anesthesia with cimetidine 5 mg/kg (H-2® inj.; JW Pharma.) and cefazolin 20 mg/kg (Cefazolin® inj.; Chongkundang Pharma.) intravenously, and glycopyrrolate 5 µg/kg (Mobinul® inj.; Myungmoon Pharma.) subcutaneously. Butorphanol 0.3 mg/kg (Butophan® inj. Myungmoon Pharma.) and midazolam 0.3 mg/kg (Midacom® inj. Myungmoon Pharma.) were used for pre-anesthesia intravenously. Anesthesia induction was performed with propofol 4 mg/kg (Provive® inj. 1%; Myungmoon Pharma.) intravenously and maintained by respiratory anesthesia machine (VME2®; MidmarkTM.) with sevoflurane 2% (sevoflurane inhaler.; Hana Pharma). As soon as the incision was made, the fragment was immediately visible and extracted with forceps (Fig 2). The case ended with a small skin incision extraction. After surgery, the patient was stable with no remarkable findings or complications.

## Discussion

According to the literature, fragmentation can happen in humans, especially in the subclavian vein and even during catheter retrieval (2). Although reports state that many catheters are detectable radiographically, this small particle of the cannula was not easily detectable due to its size. The dog

was injected using a 24G IV catheter, which had only a 0.7 mm tip attached to a 1.9 mm-long cannula in the present case.

Unexpected complications of fractured cannulas in the vein may include cardiac perforation, pulmonary thrombosis, endocarditis, sepsis, and arrhythmias in human (1). Despite its frequent use, complications of IV catheter fractures are not sufficiently studied and reported in the veterinary medicine literature. Most case reports are human cases. In addition, almost all have no clear explanation of the consequences because there are so many variables depending on the patient's conditions. Most cases relating to missing catheters reported in the literature discuss cardiovascular complications since the fractures tend to move up through the vascular system and become embedded in the heart or lung (2).

Fortunately, this case was resolved without any cardiovascular complications or need for laparotomy. The piece of cannula moved from the right forelimb, approximately 3 cm from the upper carpal bone on the radius, to the proximal end of the humerus. The fracture was finally found in the axillobrachial vein between the triceps and deltoid muscle. Since the anatomic position was in between two big muscles, the fracture was blocked to the jugular vein.

In the other human medical cases, catheter fractures with subsequent migration mostly occur with a totally implantable venous access port (TIVAP), which plays a crucial role in oncology patients (3). Although it is rare, most cases are published to inform the prognosis, so the treatment procedures are easy to find. In comparison, veterinary cases are so rare that they cannot be referred to in actual cases. Most of the cases refer to totally implant venous devices (TIVD), which accounted for 67% of the incidence and percutaneous venous catheters accounted for about 33.5% between 1985 and 2007 (5). Among the cases, catheter fracture and embolization have occurred with subclavian vein implanted devices (5). In veterinary medicine, the complication rates have not been studied since foreign body removal is not commonly performed (4).

## Conclusions

Despite the frequent use, catheter tip fracture is not sufficiently studied in veterinary medicine in terms of complications and follow-up. In this case, catheter tip retrieval surgery was successfully performed on a dog without any complications. This report may be helpful in preventing mistakes when approaching catheter tip fracture incidents in dogs.

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## Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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