

# Arthrography in Cats with Non-ionic Contrast Agent ULTRAVIST 300

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Bulletin UASVM Veterinary Medicine 71 (1) / 2014, 160-164  
Print ISSN 1843-5270; Electronic ISSN 1843-5378

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## Abstract

Arthrography with nonionic contrast agents is a method of investigation of the joint space allowing routine observations of aseptic pathological condition localized at joint ends or synovial membrane. The biological material was represented by a uniform batch consists of 8 adult cats, two males and six females, European breed, with average body weight of 3.5 kg. Method of operation was the intra-articular injection of the contrast agent Ultravist 300 followed by x-ray exposure performed at 10, 15, 30 minutes at 1 hour and 2 hours after administration of the substance. Useful doses were determined according to the joint: for the shoulder joint 2.0-2.5 ml; for elbow joint 2.0-2.5 ml, for the stifle joint 0.5-3.0 ml. Machine working parameters ranged from 48-55 kV and 15-20 mAs, patient position and radiographic exposure was latero-lateral. Quality opacification in arthrography is reduced as you increase the injection interval, the optimal period being in the first 5 minutes. The contrast notional Ultravist 300 arthrography can be used in cats with high diagnostic value in joint diseases. Side reactions were minimal and showed no significant loss in patients.

## Keywords

artrography, cat, non-ionic contrast agent, Ultravist 300, radiodiagnostic

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## INTRODUCTION

Increased interest in pets and especially cats require constant improvement of clinical and laboratory methods of examination to establish a definite diagnosis. The literature reported numerous clinical and radiographic studies, which demonstrated that arthrography is a valuable diagnostic method in joint diseases. Some authors recommend the arthrography method as a method of diagnostic in: osteochondrosis dissecans of the humeral head for shaping segment separated from the cartilage (Poulos, 1982 Vaughan, 1962), capsular rupture (Suter and Carb 1969), spontaneous degenerative joint disease (Blevins, 1980) or aseptic arthritis (Farrow, 1974).

In humans, arthrography can be used in the diagnosis of dislocation and subluxation, in bicipital lesions (tenosynovitis or muscle tears) or to diagnose the adhesive joint capsules (Resnick and Niwayama, 1995). Arthrography with non-

ionic contrast agents is a method of investigating the joint space, most commonly used in dogs and allows routine observations of pathological aseptic conditions located in joints at the ends of the synovial membrane (Lăcătuș *et al*, 2009). There are plausible reasons, that in similar circumstances, to be diagnosed by arthrography method, the same type of damage to the joints in cats. Arthrography with non-ionic contrast agent in cats are suitable especially for scapulo-humeral joints, femoro-tibio-patellar joint and is rare use for humero-radio-ulnar and the hip joint, joint which presents articular capsule. This paper aims to highlight the diagnostic value of arthrography exam in cats using non-ionic contrast agent Ultravist 300, to determining the dose for each joint, arthrography image quality, the optimum radiographic exposure, the roentgendiagnostic machine working parameters and side effects of non-ionic contrast agent on patients.

## MATERIALS AND METHODS

**The biological material** included in the study was represented by a group consisting of 8 adult cats, two males and six females of European race. The studied group was homogenous in terms of body weight, with an average body weight of 3.5 kg.

**Working protocol.** Prior to administration of non-ionic contrast substance, cats should be subject to food diets, and water will be given at discretion. Care should be taken with patients suffering from disorders of fluid and electrolyte balance, this imbalance should be corrected prior administration. Before the actual intervention, the place of injection was mechanically groomed by trimming, shaving and disinfection, and general anesthesia was performed with Ketamine in association with Xylazine, administered intramuscularly. The Ketamine 10% dose administered was 0.1 ml/kg and Xylazine dose was 0.1 mg/kg. As a contrast agent was used non-ionic substance Ultravist 300 (Bayer Healthcare Pharmaceuticals) having in composition 623 iopromide / 1 ml in aqueous solution, equivalent to 300 mg of iodine (medipedia.ro).

Joint punctures were made in a different way depending on the joint, using needles of 7 cm with 0.5 mm diameter. Ultravist 300 was used in varying doses depending on the joint in question, in order to examine the tolerance of the substance and the X-ray image quality depending on the dose. Useful dosages determined on the basis of the joint were as follows: the shoulder joint 2.0 - 2.5 ml, elbow joint 2.0 - 2.5 ml, stifle joint 0.5 - 3.0 ml.

After establishing the optimal dose based on joint and body size, was established the arthrography technique, patient position and working parameters of the X-ray device.

Due to the possible side effects, the doctor has a duty to supervise the patient at least 30 minutes after contrast substance administration. In order to insert a volume of contrast agent into the synovial sac, it is necessary to extract the same quantity of synovial fluid in order to avoid breakage of walls of the articular sacs.

After confirming introduction of the needle into the joint the externalized synovial fluid was aspirated with a syringe attached to the needle, the amount of contrast medium replacing the synovial fluid was introduced by a new syringe attached to the same needle. In order to ensure that the needle is in the joint space, radiological control is

performed, the control is recommended when the synovial fluid was removed in a very small amount.

The procedure is more efficient and safer if it is attached a transparent strip of plastic to the needle already inserted and then the other end of the extension cord is attached to the syringe. Injecting the substance was carried out slowly over a period of 20-30 seconds.

After injection of the contrast agent, the needle was removed. Radiographic exposures were made in a latero-lateral incidence. Lead times exposures were generally established after administration of contrast agent, at 10 minutes, 15 minutes, 30 minutes, 1 hour and 2 hours. After arthrography, the animals were kept under observation for 10 days, in order to detect the possible secondary reaction and perform therapeutic intervention if necessary.

## RESULTS AND DISCUSSIONS

To view the puncture as accurate as possible is recommended that it be done under radiological control, immediately after intraarticular needle insertion without the contrast administration (Fig. 1). At the shoulder joint has been observed that the maximum image quality is achieved in the first 10 minutes after injection of contrast medium (Fig. 2) and it is decreasing as the time from administration to radiographic exposure increases (Fig. 3).



**Fig. 1** Shoulder joint, radiological control before administration of contrast agent, 55 kV and 20 mAs, latero-lateral position and exposure

The dose of the non-ionic contrast agent used was 2.5 ml, X-ray parameters ranged from 48-55kV and 15-20 mAs, and exposure position was latero-lateral. One hour after administration of

the contrast in the shoulder region, the substance infiltrates the arm muscles, something that could prevent a diagnosis of certainty in breaking joint capsule (Fig. 4).



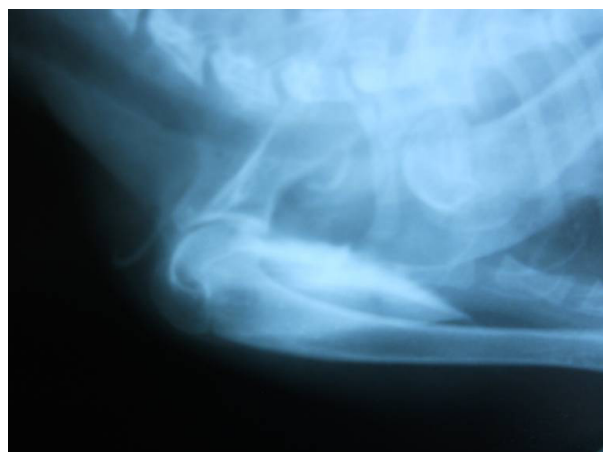
**Fig. 2** Shoulder joint, dose of 2.5 ml, at 10 minutes after administration, 55 kV, 20 mAs, latero-lateral position and exposure



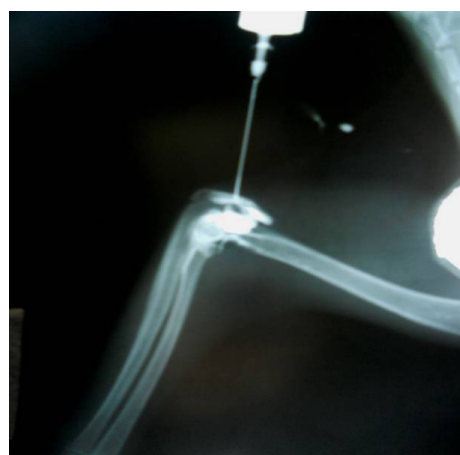
**Fig. 3** Shoulder joint, dose of 2.5 ml, at 15 minutes after administration, 55 kV, 20 mAs, latero-lateral position and exposure

At 24 hours after administration of the contrast agent in the shoulder region, the substance is completely absorbed, radiographic image showing only osteoarticular structures.

By comparing the image obtained in the elbow joint has been observed that immediately after injection (Fig. 5) and at 3 minutes (Fig 6), the image quality achieved is maximized, it diminishing as the time from administration to radiographic exposure increases. At 1 hour after administration of the substance, it is not obvious at the joint.



**Fig. 4** Shoulder joint, dose of 2.5 ml, at 1 hour after administration, 55 kV, 20 mAs, latero-lateral position and exposure



**Fig. 5** Elbow joint in cat, dose of 1 ml immediately after inoculation, 55 kV, 20 mAs, latero-lateral position and exposure



**Fig. 6** Elbow joint, dose of 2.5 ml, at 3 minutes after administration, 55 kV, 20 mAs, latero-lateral position and exposure

The dose used was between 1 – 2.5 ml of the non-ionic contrast agent, X-ray parameters ranged from 48-55 kV and 15-20 mAs, and exposure position was latero-lateral.

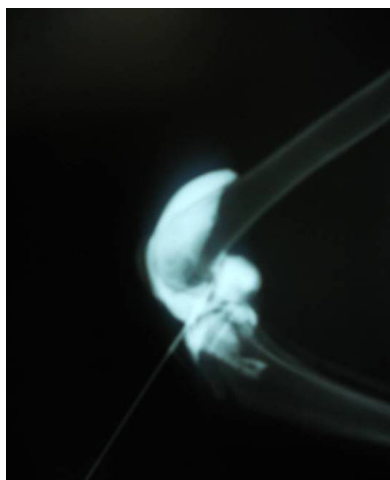
For the stifle joint, X-ray images were obtained at the time of administration, the dose of non-ionic substance ranging from 0.5-3 ml. At the dose of 0.5 ml (Fig. 7) radiographic image is of good quality but do not reveal all joint structures, and at the dose of 1 ml radiological image shows articular structures but do not highlights the sacs (Fig. 8).

The best images were obtained at doses of 1.5-2 ml. The dose of 3 ml non-ionic contrast substance cover all intra-articular structures, making the diagnosis difficult (Fig. 9).

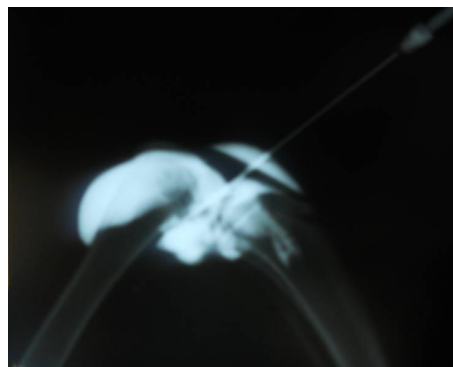
At 2 hours after administration of the substance, is still visible anterior portion of the joint capsule, the substance is absorbed almost entirely (Fig. 10). X-ray parameters ranged from 48-55 kV and 15-20 mAs, and exposure position was latero-lateral.



**Fig. 7** Stifle joint, dose of 0.5 ml, 55 kV, 20 mAs, latero-lateral position and exposure



**Fig. 8** Stifle joint, dose of 1 ml, 55 kV, 20 mAs, latero-lateral position and exposure



**Fig. 9** Stifle joint, dose of 3 ml, 55 kV, 20 mAs, latero-lateral position and exposure



**Fig. 10** Stifle joint, dose of 3 ml, 2 hours after administration, 55 kV, 20 mAs, latero-lateral position and exposure

## CONCLUSION

Following experiments performed and the results obtained, we believe that use of non-ionic contrast agent Ultravist 300 in cat arthrography may be a common contrast agent because side reactions were minimal and showed no significant loss in patients, the dose of substance administered differs according to the type of joint and high-quality radiographic images are obtained within 5 minutes of administration.

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