

EXCRETORY UROGRAPHY IN DOGS AND CATS. II. URINARY DISEASES

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SUMMARY: Excretory urography using sodium diatrizoate was performed in 144 dogs and in 14 cats clinically suspects of having urinary disorders. The purpose of the present study is to evaluate at which time following the injection of the contrast medium, the radiographic alterations were better visualized, making possible the diagnosis of these disorders. In this study the best visualizations were found in a higher frequency, either in renal or urinary bladder alterations, after 15 minutes following the injection of the contrast medium.

UNITERMS: Urinary system; Radiograph, excretory urography; Contrast medium, sodium diatrizoate; Cats; Dogs

INTRODUCTION

The importance of the excretory urography in the study of the urinary system has been the subject of many of our investigations. In a previous work, using clinically normal dogs and cats, the adequate dose of sodium diatrizoate contrast medium; at which the time following the injection of the contrast medium, the kidneys, ureters, urinary bladder, liver and the spleen were better visualized as well as the possible interferences of sedation and general anesthesia on the appearance of the radiographic images were studied.

In the present study we employed this procedure in dogs and cats clinically suspectes of having urinary disorders that are detectable on radiographic examinations. During these procedures, employing

classic radiographic techniques described elsewhere, the time needed for the better visualization of the radiographic alterations, after the administration of the contrast medium was evaluated in order to limit to the minimum the number of radiographs necessary to the radiological diagnosis of urinary disorders.

This study may contribute to reduce the costs of these examinations as well as the radiation hazards to the patients, clients and to the staff.

LITERATURE

The clinical diagnosis of the majority of urinary disorders depends on radiographic examinations. These examinations frequently require contrast procedures and among them, the excretory urography is the most employed one in veterinary clinical practice. There is a great number of studies detailing the excretory urography procedures^{9,8}.

Although providing a qualitative evaluation of renal function⁶, this procedure has the main purpose to demonstrate morphologic anomalies in the kidneys, ureters and even in the urinary bladder.

The authors that have dedicated their work to the study of radiographic patterns of urinary disorders using the excretory urography have not observed the time needed, after the injection of the contrast, for the best visualizations of these abnormalities. They all give the same indication of taking radiographs immediately after the administration of the contrast followed by others, taken in different intervals^{9,4,1,2,3,5,7}.

The first contrast radiographs represent the nephrographic phase of the excretory urography and make possible a qualitative evaluation of renal function⁶, even though some authors believe it lacks in a greater substantiation, it never substitutes laboratory tests in evaluating renal function².

In veterinary medicine the observations of adverse reactions during excretory urography are rare^{9,8}, mainly if the hydration status of the patient is evaluated.

MATERIAL AND METHOD

ANIMALS

One hundred and forty-four dogs and fourteen cats of both male and female sexes of different breeds and ages were selected from animals brought to the Veterinary Hospital of the Faculty of Veterinary Medicine of University of São Paulo in a 8-year period that after clinical examination were considered as

suspects of having urinary disorders with indication of radiographic examination to be diagnosed.

The animals were submitted to excretory urography.

RADIOGRAPHIC EXAMINATION

Radiographic Equipment

An X-Ray machine, Tridoros 4*, with 1000 mA maximum capability equipped with a Potter-Bucky grid was employed.

The X-Ray films were RP X-OMAT** and an automatic processing (RP-OMAT Processor***) was employed.

Preparation of Patient

The animals were given only water during the 24 hours prior to the contrast study. The colon and rectum were emptied using a contact laxative**** administered 12 hours prior to the examination, and followed by a flushing enema*****, when necessary.

Radiographic Technique

A technique chart relating milliamperage-second and kilovoltage to the thickness of the abdomen was employed. The radiographs were taken in ventro-dorsal and left lateral views.

Contrast Technique

Following a survey radiographic examination, the animals were submitted to excretory urography, according to IWASAKI & DE MARTIN,⁸ (1986), using sodium diatrizoate***** contrast medium in a dosage of 2 ml/kg/B.W. and radiographs were taken after 5, 15 and 30 minute intervals, following the injection of the contrast medium.

Radiographic Evaluation

A comparative study of all radiographs taken from each animal was made in order to determine the best time for the visualization of the internal organs with radiographic alterations suggestive of urinary disorders.

Statistical Analysis

The results obtained in the present study are expressed by frequencies and by their respective percentages.

RESULTS

The observations related to dogs and cats, were grouped and are shown in Tab. 1 and 2, respectively.

When evaluating the kidneys in dogs, it was initially observed that the most frequent radiographic alterations were suggestive of renal calculi and tumors. Concerning to the urinary bladder the alterations suggestive of chronic cystitis were the most frequent.

In cats, the radiographic alterations of kidneys were suggestive of hydronephrosis and among the urinary bladder alterations, the most frequent were compatible with chronic cystitis. These were the only findings.

Comparing each other, the survey and the contrast radiographs, in all cases, the radiographic alterations were better visualized in the contrast ones. In cases of renal calculi, although the radiopacity corresponding to the calculi were better seen on survey radiographs, only the excretory urography enabled the evaluation of renal integrity and urinary flow.

The radiographic alterations suggestive of several disorders, in both species, were best visualized in radiographs taken 15 minutes following the injection of the contrast medium.

DISCUSSION AND CONCLUSIONS

The frequent occurrence of urinary disorders in animals has motivated many investigations, mainly in the field of diagnosis. Among these studies, the excretory urography, frequently employed in small animal practice, has received special attention.

This technique provides additional information to the clinical examination, mainly the ones related to the anatomic-radiographic aspects of the organs that constitute the urinary system, although it may be possible to estimate renal function from a serial contrast study.

There is a great number of studies detailing excretory urography procedures but no uniformity was found concerning the time intervals when the radiographs should be taken during this procedure. However, it was found a common preference for sodium diatrizoate preparations as the contrast

* Siemens S.A.

** Kodak Brasileira Com. e Ind. Ltda.

*** Eastman Kodak Company

**** Laxonalin - Laboratório Organon do Brasil Ltda.

***** Fleet enema - Laboratório Ayerst Ltda

***** Hypaque 50% - The Sydney Ross Co.

media 9,4,1,2,3,5,7.

In a previous work, the dosage of this contrast material was determined to be 2 ml/Kg/B.W., for dogs and cats.

In dogs and cats, the best visualizations of radiographic alterations suggestive of the various renal and bladder pathologies were found in a higher frequency after 15 minutes following the injection of the contrast medium. (Fig. 1 to 4)

This fact, allows us to preconize the use of excretory urography, limiting the procedure to an examination of survey radiographs followed by contrast radiographs taken after 15 minutes following the injection of the contrast medium.

In less frequent occasions it may be necessary to take more radiographs during excretory urography, mainly when a detailed evaluation of renal function is desired. Even though, on radiographs taken after 15 minutes the excretion of the contrast by glomerular filtration may be estimated by analysing the densities of the renal parenchima and bladder content.

By this means, this exam may be easier to execute, with reduced costs and radiation hazards to the patients, clients and staff.

In agreement with the consulted literature, during the present study no adverse reaction due to the use of contrast medium was observed 9,8.

IWASAKI, M. & DE MARTIN, B.W. Urografia excretora em cães e gatos. II. Afeções urinárias. *Braz. J. vet. Res. anim. Sci.*, São Paulo, 27(1):75-81, 1990.

RESUMO: Pesquisou-se em 144 cães e 14 gatos clinicamente suspeitos de portarem afeções urinárias e que foram submetidos à urografia excretora, com contraste à base de diatrizoato de sódio, em que tempo decorrido da injeção do contraste ocorreram as melhores visualizações das alterações radiográficas, que possibilitaram o diagnóstico das patologias encontradas. Verificou-se que as maiores frequências das melhores visualizações, tanto das alterações renais como vesicais, ocorreram 15 minutos após a injeção do contraste.

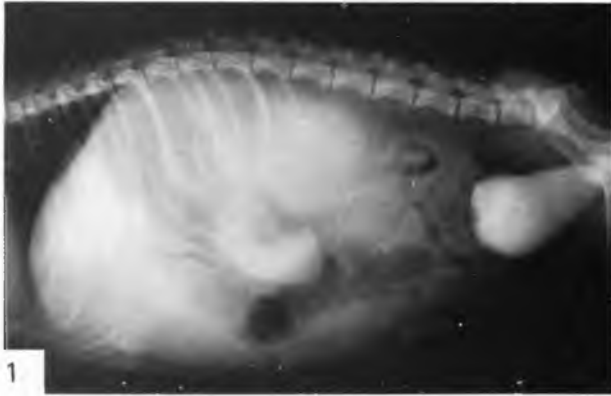
UNITERMOS: Sistema urinário; Radiografia, urografia excretora; Meio de contraste, diatrizoato de sódio; Cães; Gatos

TABLE 1 - Frequencies (F) and respective percentages of the best visualization of radiographic images (R.I.) that enabled the diagnosis of urinary disorders in 144 male and female dogs, of different breeds and ages, taken after 5, 15 and 30 minute intervals following the injection of sodium diatrizoate contrast medium (Hypaque 50%). São Paulo, 1989.

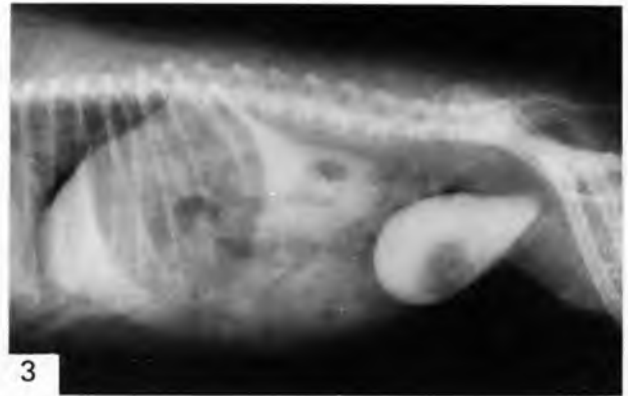
ORGANS	PATHOLOGIES	TIME		5 MIN		15 MIN		30 MIN		TOTAL
		R.I.	F	%	F	%	F	%		
Kidneys	Renal Calculi		2	16.67	10	83.33	0	0	12	
	Renal Tumor		0	0	11	91.67	1	8.33	12	
	Hydronephrosis		2	18.18	9	81.82	0	0	11	
	Subtotal		4	11.43	30	85.71	1	2.86	35	
Bladder	Cystitis		0	0	72	91.14	7	8.86	79	
	Cystocele		0	0	15	100.00	0	0	15	
	Tumor		0	0	8	100.00	0	0	8	
	Diverticulum		0	0	4	100.00	0	0	4	
	Rupture		0	0	3	100.00	0	0	3	
	Subtotal		0	0	102	93.58	7	6.42	109	
TOTAL									144	

TABLE 2 - Frequencies (F) and respective percentages of the best visualization of radiographic images (R.I.) that enabled the diagnosis of urinary disorders in 14 male and female cats, of different breeds and ages, taken after 5, 15 and 30 minute intervals following the injection of sodium diatrizoate contrast medium (Hypaque 50%). São Paulo, 1989.

ORGANS	PATHOLOGIES	TIME		5 MIN		15 MIN		30 MIN		TOTAL
		R.I.	F	%	F	%	F	%		
Kidneys	Hydronephrosis		1	33.33	2	66.67	0	0	3	
	Subtotal		1	33.33	2	66.67	0	0	3	
Bladder	Cystitis		0	0	8	100.00	0	0	8	
	Cystocele		0	0	3	100.00	0	0	3	
	Subtotal		0	0	11	100.00	0	0	11	
TOTAL									14	



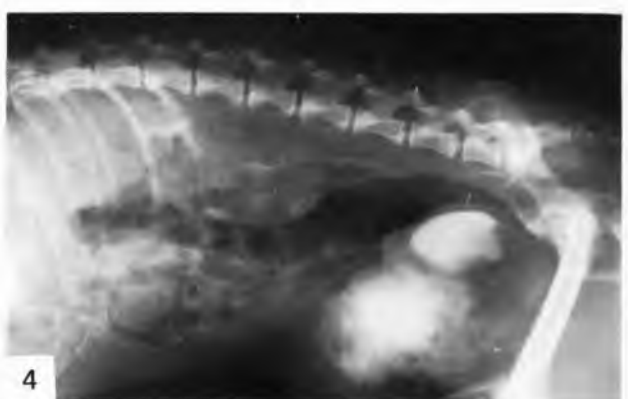
1



3



2



4

FIGURE 1 – Left lateral view of a dog. Excretory urography made 15 min after injection of the contrast medium (Hypaque 50%) showing dilatation of the pelvis. (Hydronephrosis)

FIGURE 2 – Left lateral view of a cat. Excretory urography made 15 min after injection of the contrast medium (Hypaque 50%) showing mucosal irregularities in the cranial pole of the urinary bladder. (Cystitis)

FIGURE 3 – Left lateral view of a dog. Excretory urography made 15 min after injection of the contrast medium (Hypaque 50%) showing filling defects in the bladder lumen. (Neoplasia)

FIGURE 4 – Left lateral view of a dog. Excretory urography made 15 min after injection of the contrast medium (Hypaque 50%) showing extravasated contrast medium in the peritoneal cavity. (Rupture)

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