

Hydronephrosis in a Bitch with Ovarian Remnant Syndrome - Postsurgical Complications

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ABSTRACT

Background: Elective ovariohysterectomy (OH) is minimally invasive, but when performed incorrectly, it can lead to postsurgical complications, such as stump pyometra, ovarian remnant syndrome and foci of adhesion generated by tissue reactions to threads and materials used in vessel hemostasis. The formation of adhesions and successive surgeries predisposes patients to other diseases, such as ureteral obstruction and hydronephrosis. Thus, we reported a case of hydronephrosis in a bitch submitted to conventional OH, followed by ovariectomy (OV) due to ovarian remnant syndrome and consequent intraperitoneal adhesions caused by successive surgical interventions.

Case: A 11-year-old mixed breed medium size bitch with a history of stump pyometra and ovarian remnant syndrome (SOR) was treated at the Veterinary Hospital-HV of UFPA after 2 previous surgeries. It had been spayed using conventional OH and underwent ovariectomy OV approximately 4 years ago, as it showed signs of estrus after the first surgery, characterizing SOR. On physical examination, its abdomen was distended especially in the left hemiabdomen, with no palpable pain. Ultrasonography showed a cavity in the topographic area of the left kidney, with anechoic content, thin walls, and defined contour. There were nonvascularized tubular structures, suggesting hydroureter and severe hydronephrosis. Exploratory celiotomy was performed, showing the intense presence of abdominal adhesions, followed by an incision in the abdominal midline from the xiphoid process in a caudal direction to the pubis, thereby showing the left kidney. After vesical drainage of 900 mL of renal filtrate, atrophy of the renal parenchyma and preservation of the renal capsule was considered, resulting in its complete resection, followed by the synthesis of the abdominal wall. In the postoperative period, the patient was properly monitored and obtained a satisfactory outcome manifested by a complete recovery. After vesical drainage of 900 mL of renal filtrate, atrophy of the renal parenchyma and preservation of the renal capsule only was considered, resulting in its complete resection, followed by the synthesis of the abdominal wall. In the postoperative period, the patient was properly monitored and obtained a satisfactory outcome manifested by a complete recovery. After vesical drainage of 900 mL of renal filtrate, renal parenchymal atrophy and preservation of the renal capsule only was adopted.

Discussion: The choice of the conventional OH technique, followed by the failure to perform, favored the formation of adhesions only diagnosed late. Less invasive alternatives achieved less long-term damage. Excessive intracavitary manipulation and reaction to the nylon suture thread favored the development of these adhesions, and consequently, unilateral obstruction of the left ureter, hydroureter, hypertrophy, and destruction of the renal parenchyma, led the patient to undergo a third surgery, namely, unilateral nephrectomy. In this case, no changes were observed in serum levels, leaving only a subtle abdominal enlargement with hydronephrosis installed silently. There was no possibility of carrying out initial surgical planning, as the affected kidney, making unilateral nephrectomy necessary. Currently, the patient has normal renal function in the contralateral organ, with no clinical or laboratory changes because the affected kidney was not functional, making unilateral nephrectomy necessary. Currently, the patient has normal renal function with no clinical or laboratory changes because the affected kidney was not functional, making unilateral nephrectomy necessary. Currently, the patient has normal renal function in the contralateral organ, with no clinical or laboratory changes.

Keywords: ovariohysterectomy, ovariectomy, adherence, hydronephrosis, bitch.

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INTRODUCTION

Elective ovariohysterectomy (OH) is a routine procedure with low complications after its exploration. However, several postsurgical complications, such as stump pyometra, accidental ligation of the ureter and ovarian remnant syndrome can possibly occur. Even foci of adhesion generated by tissue reactions to threads and materials used in vessel hemostasis can occur [9,14].

Adhesions are bands or bridges of newly formed fibrous tissue, connecting 2 or more anatomically separate structures, which can form between the abdominal organs and other organs and the peritoneum [1,10]. They may result from excessive manipulation of the organ during surgery or from continuous surgical interventions, causing unilateral or bilateral extramural obstructions of the ureters or other portions of the genitourinary system, thereby causing constant dilation of the ureter, predisposing the hydroureter and subsequently to hydronephrosis [3,15].

Considering the postsurgical complications of companion animals, new approaches that are minimally invasive, such as ovariectomy (OV), miniceliotomy (the "hook" technique), and video-assisted surgeries with different forms of access, have become methods of choice in castrations, in order to reduce tissue damage, bleeding and for providing less recovery time, provided they are performed with full mastery of the technique [5,12]. Thus, we reported a case of hydronephrosis, with late diagnosis, in a bitch submitted to conventional OH, followed by OV due to ovarian remnant syndrome and consequent processes of intraperitoneal adhesion, caused by these successive surgical interventions.

CASE

A 11-year-old bitch mixed breed of medium size, with a history of stump pyometra and ovarian remnant syndrome (SOR), was treated at the Veterinary Hospital (HV) of the UFPA, and had previously undergone 2 surgeries. She had been spayed using the conventional ovariohysterectomy technique and underwent ovariectomy approximately 4 years ago, as she showed signs of estrus after the first surgery, characterizing SOR.

On physical examination, she presented with abdominal distention with a more pronounced volume in the left hemiabdomen, without definition or pain on palpation. No changes in blood count and hepatic and renal serum profiles. Ultrasound showed a cavity in

the topographic area of the left kidney, with anechoic content, thin walls, and defined contour (Figure 1A). Adjacent to this, there was a nonvascularized distended tubular structure (hydroureter) and severe hydronephrosis, opting for an exploratory celiotomy (Figure 1B).

After the preoperative preparations, the patient was administered diazepam¹ [Diazepam® - 0,5 mg/kg, i.v., in a single dose], anesthetic induction with propofol² [Propofol® - 4 mg/kg, i.v., in a single dose], and general inhalational anesthesia with isoflurane³ [Vetflurane® - 1000 mg/g]. Next, a median retro-umbilical celiotomy was performed, showing the intense presence of abdominal adhesions, mainly due to the cavity structure observed in the ultrasound³ [SonoScape®].

The incision was extended from the xiphoid process in a caudal direction to the pubis. Then the left kidney was exposed by elevating the mesocolon and isolated from the other components of the abdominal cavity using compresses (Figure 1C). Bladder drainage of 900 mL of renal filtrate was performed, emptying it completely and admitting the total atrophy of the renal parenchyma and preservation of only the renal capsule (Figure 1D), which resulted in its complete resection, followed by of the patient's abdominal wall and the postoperative care following the standard technique [8].

Histopathological analysis confirmed that the obstruction in the distal region of the left ureter led to its enlargement, and the collected renal fragment consisted of remnants of the renal parenchyma, characterized by dilated tubules, lined with squamous epithelium and filled with hyaline material, interspersed with fibrous connective tissue. The renal pelvis showed foci of transitional epithelium with hyperplasia and the ureter showed hypertrophy to the muscular layer.

Postoperatively, the patient received fluid therapy on the first day, analgesia with tramadol hydrochloride¹ [Cronidor® 2% - 2 mg/kg, v.o., SID, during 5 days], dipyrone⁵ [Dipirona Biovet 50% - 25 mg/kg, i.v., TID, during 5 days] and antibiotic therapy with cephalixin⁶ [Petsporin® 75 mg - 25 mg/kg, v.o, TID, during 8 days]. She was duly monitored and obtained a satisfactory result from the procedure. Suture removal was performed after 10 days, with complete recovery.

DISCUSSION

The choice of the conventional OH technique instead of the OV, followed by the failure to perform the technique, resulted in complications such as stump

pyometra, associated with ovarian remnant syndrome, submitting the patient to another surgical procedure, predisposing it to the formation of adhesions [10,11]. Factors such as excessive intracavitary manipulation and reaction to the nylon suture thread favored the development of adhesion and, consequently, unilateral obstruction of the left ureter, the hydroureter, hypertrophy, and destruction of the renal parenchyma [15].

There are reports showing that the nonabsorbable nylon thread, when used in the ligation of the ovarian pedicles and the uterine body, induces a greater tissue reaction and the formation of adhesions [7]. Considering that the renal impairment occurred due to the compression of the ureter by fibrous connective tissue in the uterine stump and an inflammatory response to the materials used, with no accidental ligation of the ureter as a cause of hydronephrosis, it

is concluded that the compression of the left ureter occurred progressively obstructed in 4 years, configuring a late complication, leading the patient to undergo a 3rd surgery, unilateral nephrectomy [4,15].

Less invasive alternatives, such as OV by the “hook technique” or laparoscopic with 2 portals, would reduce this damage and prevent serious conditions, such as extramural obstruction of the genitourinary system. Conventional OH technique is one of the techniques causing majority of postsurgical intraperitoneal adhesions [2,6].

Unilateral hydronephrosis can remain asymptomatic for a long time, especially if the contralateral kidney is functionally preserved. In this case, no changes were observed in serum levels, except for a subtle increase in the patient’s abdomen was observed. However, the permanence of the affected kidney in the abdominal cavity would lead to a possible rupture and consequently

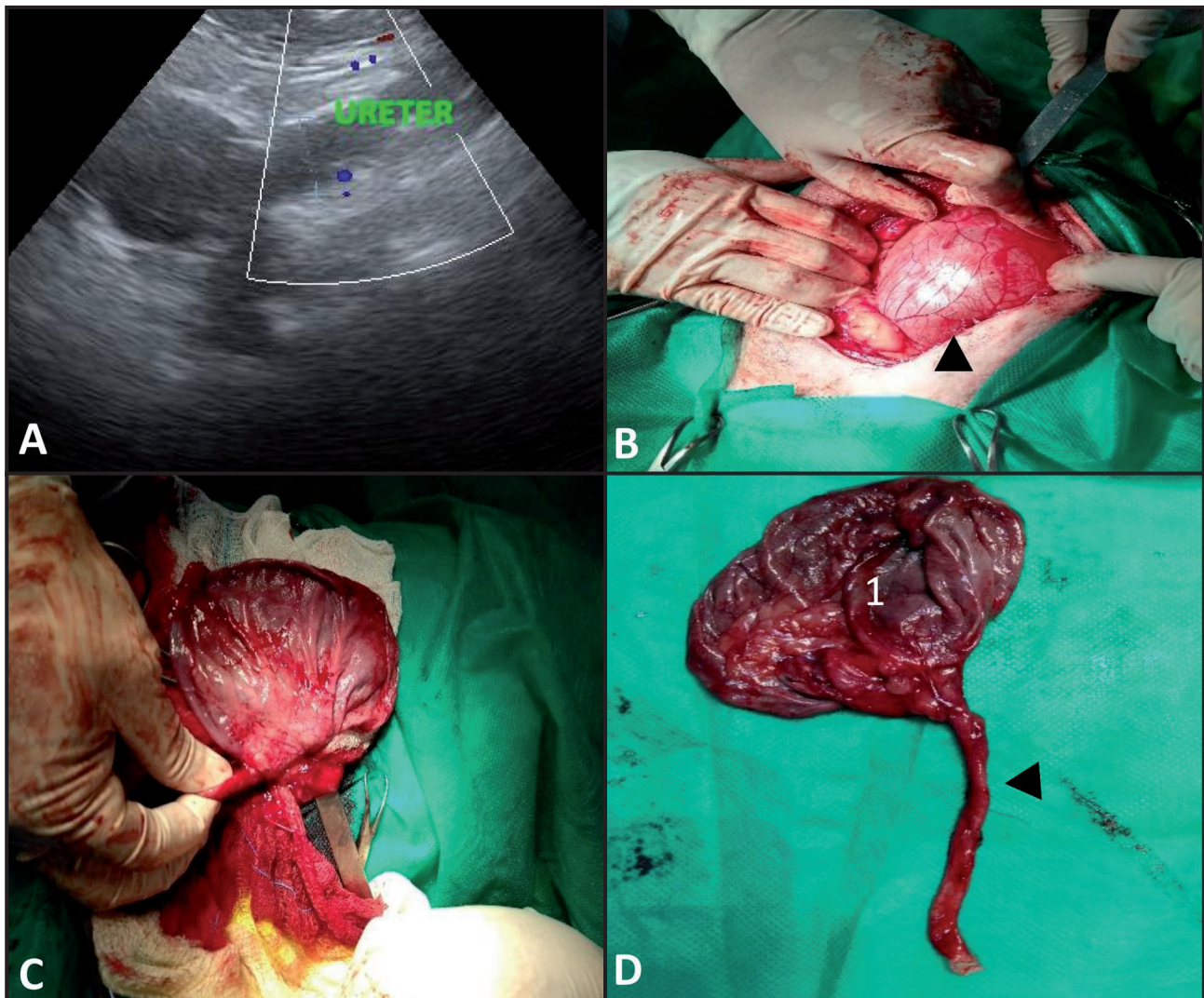


Figure 1. Ultrasographic diagnosis and celiotomy nephrectomy in case of hydronephrosis in a bitch. A - Ultrasound image of distended left ureter suggesting hydroureter. B - Celiotomy showing left kidney in situ filled with translucent liquid content (black arrowhead). C - Left kidney and ureter after draining 900 mL of filtrate. D - *Ex situ* atrophied left kidney (1) and distended ureter after nephrectomy (black arrow).

a uroperitoneum. This leads to uremia, dehydration, hypovolemia, hyperkalemia and death [3,15].

The initial procedure would only be investigative, initially planning only the adhesiolysis of the organs or removal of the adjacent tissues involved in the inflammatory process together with the foreign bodies involved in the obstruction of the left ureter. However, given the severity and changes found in the left kidney during surgery, as it did not have functionality, adhesiolysis in the ureter was not possible, making unilateral nephrectomy necessary. The patient has normal renal function contralaterally, with no clinical or laboratory changes.

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REFERENCES

- 1 **Capella-Monsonís H., Kearns S., Kelly J. & Zeugolis D.I. 2019.** Battling adhesions: from understanding to prevention. *BMC Biomedical Engineering*. 1: 5. DOI: 10.1186/s42490-019-0005-0.
- 2 **Charlesworth T.M. & Sanchez F.T. 2019.** A comparison of the rates of postoperative complications between dogs undergoing laparoscopic and open ovariectomy. *Journal of Small Animal Practice*. 60(5): 325-325. DOI: 10.1111/jsap.12993.
- 3 **Coghill F.J., Tipler A. & Moisés F. 2020.** Neoureterocystostomy for the management of a ureteral-uterine stump fistula as a complication post ovariohysterectomy. *Veterinary Record Case Reports*. 8: 4. DOI: 10.1136/vetreccr-2020-001272.
- 4 **Cole L., Humm K. & Dirrig H. 2021.** Exame de ultrassom focalizado de distúrbios do trato urinário de emergência canina e felina. *Veterinary Clinics: Small Animal Practice*. 51(6): 1233-1248. DOI: 10.1016/j.cvsm.2021.07.007.
- 5 **Coutinho A.J., Gasser B., Rodriguez M.G.K., Uscategui R.A.R., Santos V.J.C., Tiosso C.F., Barros F.F.P.C. & Toniollo G.H. 2018.** Comparison between single port videolaparoscopy and miniceliotomy with snock hook ovariohysterectomy techniques in bitches. *Ciência Rural*. 48: 10. DOI:10.1590/0103-8478cr20180345.
- 6 **Fernández-Martín S., Valiño-Cultelli V. & González-Cantalapiedra A. 2022.** Laparoscopic versus Open Ovariectomy in Bitches: Changes in Cardiorespiratory Values, Blood Parameters, and Sevoflurane Requirements Associated with the Surgical Technique. *Animals*. 12(11): 1438. DOI: 10.3390/ani12111438
- 7 **Fischer A., Koopmans T., Ramesh P., Christ S., Strunz M., Wannemacher J., Aichler M., Feuchtinger A., Walch A., Ansari M., Theis F.J., Schorpp K., Hadian K., Philipp-Alexander Neumann, Schiller H.B. & Rinkevich Y. 2020.** Post-surgical adhesions are triggered by calcium-dependent membrane bridges between mesothelial surfaces. *Nature Communications*. 11: 3068. DOI:10.1038/s41467-020-16893-3.
- 8 **Griffin M.A., Culp W.T.N., Munro M.J.L., Palm C.A. & Wanamaker M.W. 2021.** Surgical treatment of retroiliac ectopic ureters with secondary hydronephrosis and hydroureter in a dog. *Journal of the American Veterinary Medical Association*. 258: 7. DOI: 10.2460/javma.258.7.740.
- 9 **Ghazy A., Atiba A. & Kotb W. 2017.** Assessment of Suturing Technique, Gelatin Sponge and Aluminum Chloride in Controlling Hepatic Bleeding and Abdominal Adhesions in Dogs. *Advances in Animal and Veterinary Sciences*. 5(2): 56-61. DOI: 10.14737/journal.aavs/2017/5.2.56.61.
- 10 **Hassanabad A.F., Zarzycki A. N., Jeon K., Dundas J.A., Vasanthan V., Deniset J.F. & Fedak P.W.M. 2021.** Prevention of Post-Operative Adhesions: A Comprehensive Review of Present and Emerging Strategies. *Biomolecules*. 11(7): 1027. DOI:10.3390/biom11071027.
- 11 **Hyun J.E. & Han H.J. 2021.** Small Bowel Obstruction Induced by Concurrent Postoperative Intra-Abdominal Adhesions and Small Bowel Fecal Materials in a Young Dog. *Veterinary Sciences*. 8(5): 83. DOI: 10.3390/vetsci8050083.
- 12 **Lacitignola L., Guadalupi M. & Massari F. 2021.** Single Incision Laparoscopic Surgery (SILS) in Small Animals: A Systematic Review and Meta-Analysis of Current Veterinary Literature. *Veterinary Sciences*. 8(8): 144. DOI:10.3390/vetsci8080144.

- 13 Miloje D., Ljubomir J., Milan A., Svetlana N. & Nedić Sreten. 2017.** Mucometra in a bitch as a consequence of a serious professional mistake. *Veterinarski glasnik*. 71(2): 107-116. DOI: 10.2298/VETGL170322009D.
- 14 Plater B.L. & Lipscomb V.J. 2020.** Treatment and outcomes of ureter injuries due to ovariohysterectomy complications in cats and dogs. *Journal of Small Animal Practice*. DOI: 10.1111/jsap.13100 Corpus ID: 210842534
- 15 Zaiden L., Germano G.L., Severino Neto A.C., Moraes R.S., Carmo J.M.C., Amaral A.V.C., Regalin B.D.C. & Saturnino K.C. 2021.** Hydronephrosis in a Dog Related to Ovariosalpingohysterectomy. *Acta Scientiae Veterinariae*. 49(Suppl 1): 731. 6p. DOI: 10.22456/1679-9216.117490.