

Anal Atresia in Canines - Microsurgery for Treatment

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ABSTRACT

Background: Anal atresia is the most common anorectal malformation in dogs. The treatment of choice for this type of deformity is surgical, with the possibility of postoperative complications. Hyperbaric oxygen therapy (HBOT) consists of offering 100% oxygen in pressurized environments. HBOT causes tissue hyperoxygenation, stimulation of fibroblast angiogenesis and tissue proliferation and is recommended for tissue injuries and for cicatrization. This work describes the surgical correction of cases of anal atresia in 2 young dogs, 1 of which is associated with a rectovaginal fistula, using microsurgical techniques. In addition, it also describes the associated complications, such as rectal stenosis and vaginal prolapse.

Cases: *Case 1.* Describes a 21-day-old, mixed-breed male dog, with no fecal elimination since birth, caused by type III anal atresia. The patient was submitted to the procedure using a surgical microscope with 10x magnification. The skin and subcutaneous tissue were incised over the anal dimple area and the rectum was located and incised up to the lumen. The mucocutaneous suture was performed in a simple isolated pattern with 6-0 polydioxanone, circling the rectal access at 360°. Subsequently, he developed anal stenosis, treated with anal dilation procedures using balloon endotracheal tubes and enemas. The patient died at home, with no possibility of confirming the cause of death. *Case 2.* Reports the microsurgical procedure performed on a 60-day-old bitch with type III anal atresia associated with a rectovaginal fistula. The procedure started with episiotomy to identify the presence of communication of the roof of the vagina and the ventral wall of the rectum. The communication was identified with approximately one centimeter of depth. Ligature was performed for occlusion of the rectovaginal communication, with 6-0 polydioxanone. Anal atresia was corrected in a manner similar to that previously described, with a cross cutaneous incision in the anal dimple area. After identification of the rectum, an incision up to the lumen was performed followed by a 360° mucocutaneous suture using 6-0 polydioxanone thread in a simple isolated pattern. The vaginal roof was reconstructed. The patient presented stitches dehiscence treated conservatively and with an association of 2 sessions of hyperbaric oxygen therapy at 2ATA. After 250 days, the patient developed vaginal prolapse type III and was subjected to clinical therapy and ovariectomy. Conservative treatment did not have the expected effect. Therefore, the patient was referred for vaginal resection with vulvoplasty. The patient is clinically stable 900 days after the last surgical procedure.

Discussion: The greatest difficulty is the presence of delicate tissues and impaired visualization due to the location of the blind end of the rectal pouch within the pelvic cavity. The surgeries were considered satisfactory and the postoperative complications were consistent with what was reported in the literature. The use of microsurgery provided excellent visualization of the structures, preservation of the anal sphincter in *case 2*, and precise mucocutaneous suture. HBOT helped the patient's healing process. This is the 1st report of vaginal prolapse in a bitch with anal atresia. It is concluded that the microsurgery is an excellent tool for the treatment of anal atresia in dogs.

Keywords: anorectal malformation, surgical microscope, veterinary surgery, vaginal prolapse.

INTRODUCTION

Anal atresia is defined as the lack of complete communication between the rectum and the anus [6]. It is also the most common anorectal malformation and is observed mainly in dogs. The incidence of anal atresia in dogs is approximately 0.7% and females are 1.8 times more likely to have it than males [14]. Data on anal atresia in dogs in the scientific literature are scarce since the vast majority of patients die before diagnosis or undergo early euthanasia [6].

Atresia can be classified according to the anatomical changes found. In general, they are classified into 4 grades [6,14]. Some authors consider the participation of rectovaginal fistulas in the classification of the pathology [4,6], while others propose it based only on the conformation of the rectum [14].

Surgical correction is challenging in pediatric patients, is often in unfavorable physical conditions, and functional complications are a cause for concern [10]. Alternatively, microsurgery is widely used in many surgical fields, such as plastic and reconstructive surgery [7]. This study aimed to report the surgical correction of two cases of type III canine anal atresia, one of which is associated with the presence of a rectovaginal fistula, with the use of microsurgery.

CASES

Case 1. A 21-day-old mixed breed dog, weighing 440 g, was attended at the Veterinary University Hospital (HUV) of the Federal University of Santa Maria (UFSM), Santa Maria, Rio Grande do Sul, Brazil. The main clinical complaint was anal imperforation and absence of fecal elimination from birth. The clinical examination revealed abdominal bulging, discomfort and diagnosis of anal atresia by visualization of the perineal region. The patient had anemia (hematocrit 26%; hemoglobin 8.3 g/dL), anisocytosis, polychromasia and hypoproteinemia (plasma proteins 5 g / dL). Leukometry indicated leukocytosis with a left shift. No imaging tests were performed.

The patient was stabilized, remained under observation, and was submitted to the surgical procedure at 25 days of life. After an anesthetic protocol adapted to the patient, he was shaved in the perineal region, positioned in the sternal decubitus position, the surgical area received antisepsis and sterile surgical drapes (Figure 1A). A surgical microscope with 10x magnification was positioned. Two points of support

were applied to the skin, laterally to the incision site. The skin and subcutaneous tissue were incised vertically, over the anal dimple area. After careful tissue dissection, the rectum was located and stabilized with retaining sutures and then incised up to the lumen. The mucocutaneous suture was performed in a simple isolated pattern with 6-0 polydioxanone, circling the rectal access at 360° (Figure 1 B-C). The patient showed good recovery from anesthesia and continued with the use of analgesic and antimicrobial medications.

During 10 days, the patient underwent enemas with warm water in order to dissolve the dry fecal contents in the colon, with no resolution of the condition, which was confirmed by an abdominal radiograph (Figure 1D). On the 11th postoperative day, the patient presented considerable stenosis of the anal orifice and was submitted to anal dilation. For that, endotracheal tubes with balloons, of sizes 3 mm and 3.5 mm, were used. After positioning the balloon in the center of the stenosis, it was filled with liquid for 2 min (Figure 1E). The procedure was performed twice with each tube, starting with the smallest caliber.

After anal dilation, the fecal contents were inspected using an 18 cm rigid cystoscope with 30° and 1.9/2.1 mm in a 9.5Fr sheath (Figure 1F). In a video-assisted manner, the feces were hydrated with warm water and dissolved using a palpation hook. It was possible to eliminate a large amount of fecal content present in the rectum and descending colon. After 3 days, a new anal dilation was performed and the patient presented a cardiorespiratory arrest which was satisfactorily reversed, as recommended by the literature [5]. Again, after 3 days, anal dilations were repeated without complications.

According to the guardian, after hospital discharge the fecal elimination capacity was preserved. However, the patient worsened in the general clinical picture showing apathy and weakness. The patient did not return to the hospital and underwent home treatment without scientific support, dying without the possibility of a necropsy to confirm the cause of death.

Case 2. An approximately 60-day-old mixed breed bitch, weighing 630 g, showing efforts to defecate was seen at the same Veterinary Hospital. The patient had abdominal bulging and vulvar fecal content, associated with anal imperforation (Figure 2A). Laboratory tests revealed anemia (hematocrit 33.4% and hemoglobin 11.3 g/dL) and hypoproteinemia (plasma

proteins 4.8 g/dL; albumin 1.8 g/dL). A fistulogram was performed, which did not allow satisfactory evidence of the fistulous path. The animal was referred for surgical correction of anal atresia and rectovaginal fistula.

After an anesthetic protocol adapted to the bitch and surgical antisepsis, the procedure started with episiotomy and tissue dissection to identify the structures (Figure 3A). There was a presence of communication with direct adherence between the roof of

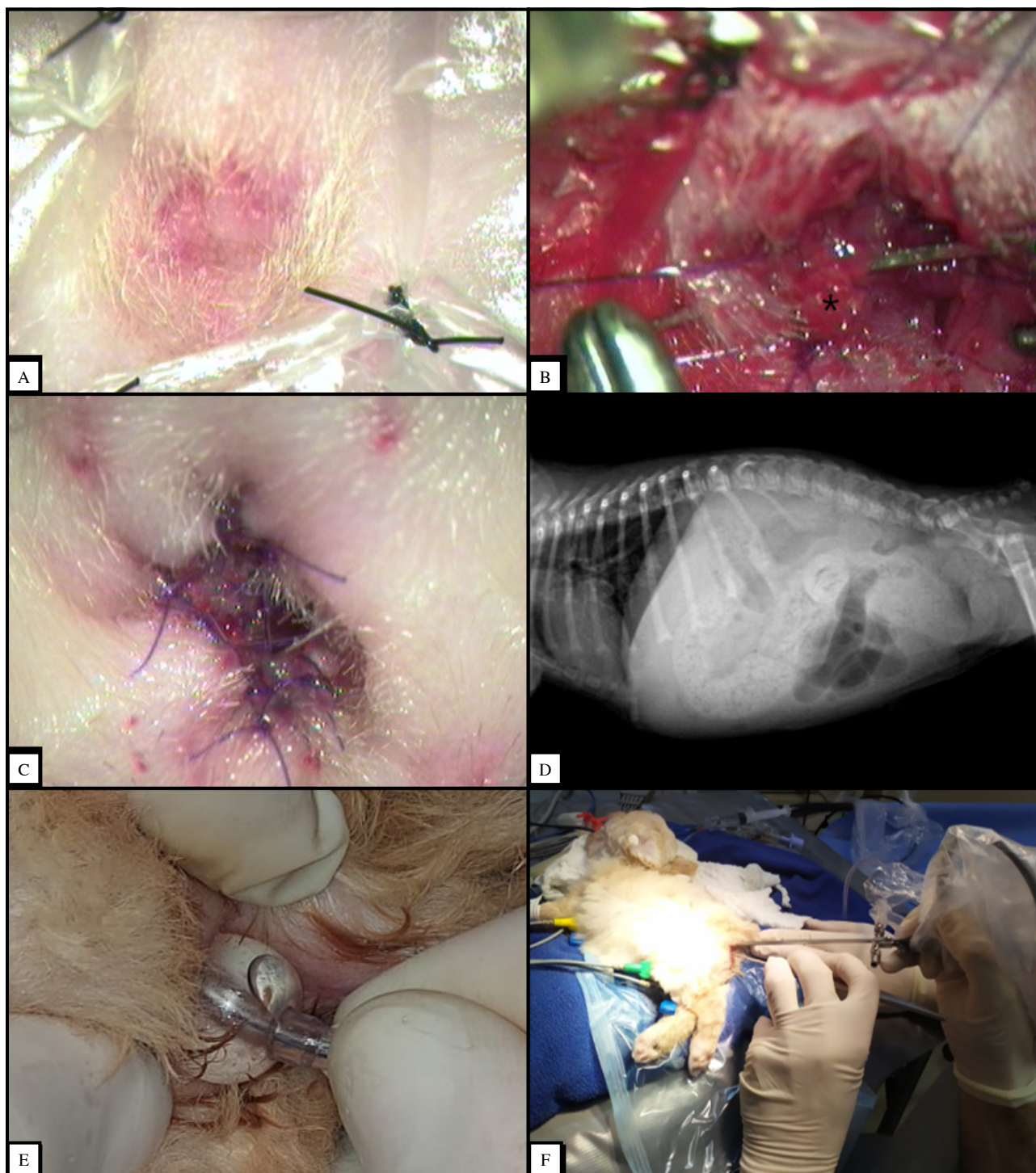


Figure 1. Case 1: Dog with type III anal atresia corrected with microsurgery. A- Anal dimple area with imperforation. B- Mucocutaneous suture, between skin and rectal mucosa, with 6-0 polydioxanone in a simple isolated pattern. C- Final aspect of the anoplasty. D- Simple radiograph showing the accumulation of feces in the colon 10 days after the operation. E- Anal dilation with a 3 mm endotracheal tube with balloon, inflated with liquid. F- Inspection and dissolution of fecal content with 18 cm rigid cystoscope, 30° and 1.9/2.1 mm in a 9.5Fr sheath and a palpation hook. [*Rectal mucosa].

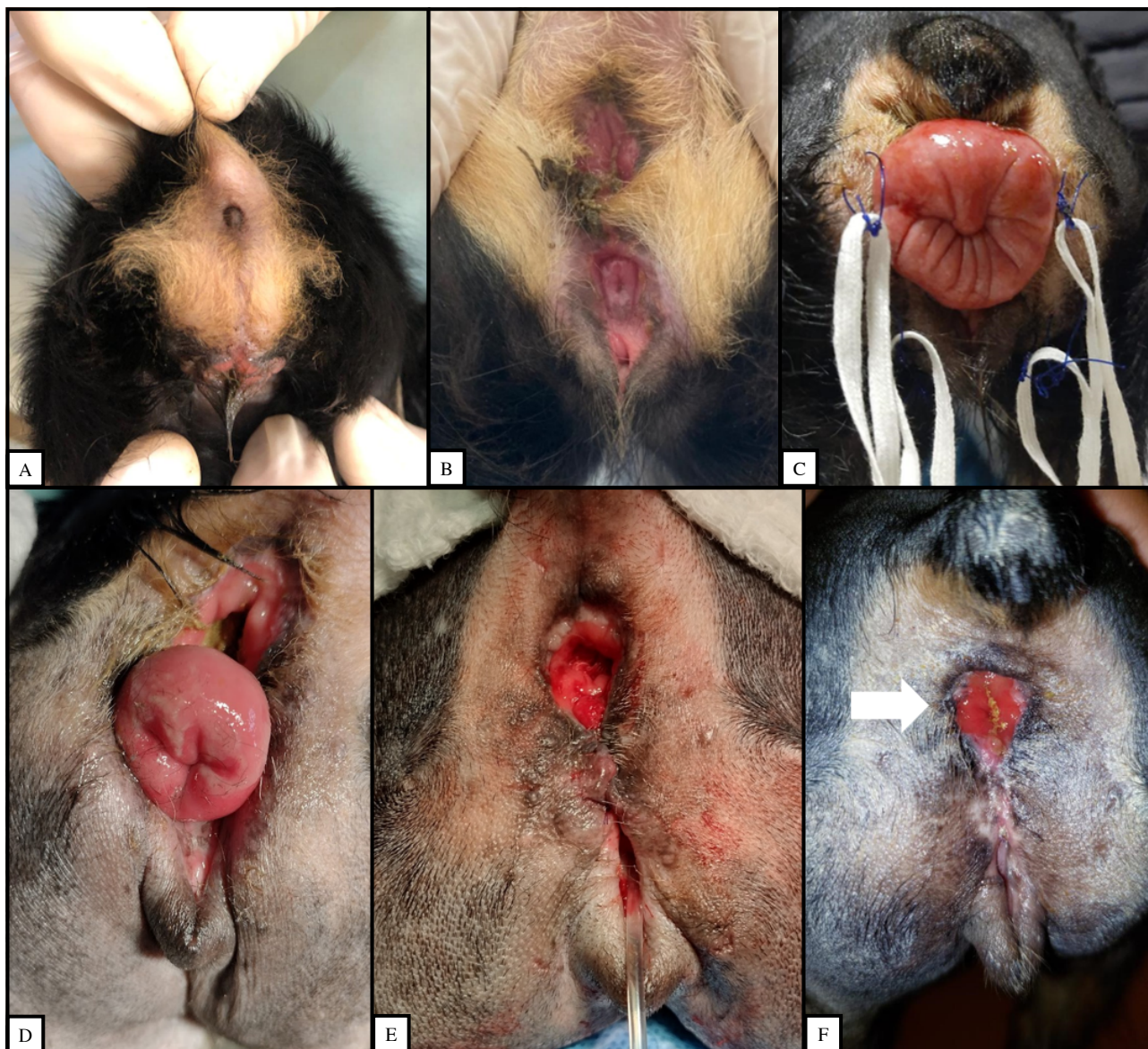


Figure 2. Case 2: Bitch with type III anal atresia associated with rectovaginal fistula submitted to microsurgery treatment. A- Aspect prior to the surgical procedure, with visualization of the anal dimple in the region of the imperforate anus and the presence of feces in the vulva. B- Appearance after 210 days of surgical correction, with accumulation of feces in the coat above the vulvar region. C- Vaginal prolapse type III and positioning of tie-over bandages. D- Partial reduction of vaginal prolapse 66 days after ovariectomy and clinical therapy. E- Immediate postoperative period and F- healed wound after vaginal resection and vulvoplasty. [Arrow- final appearance after microsurgical anoplasty].

the vagina and the ventral wall of the rectum, without the formation of a classic fistulous path. The communication was identified with approximately 1 cm of depth. Ligature was performed for occlusion of the rectovaginal communication, with 6-0 polydioxanone.

Anal atresia was corrected in a manner similar to that previously described, however, now with a cross cutaneous incision in the anal dimple area. The surgical microscope allowed the visualization of the external anal sphincter, which was preserved within the limits imposed by dissection. After identification of the rectum, which also ended in a blind pouch, 2

retaining sutures were placed and an incision up to the lumen was performed followed by a 360° mucocutaneous suture using 6-0 polydioxanone thread in a simple isolated pattern (Figure 3B). The vaginal roof was reconstructed with isolated sutures (Figure 3C). Immediately after, there was fecal elimination through the anal orifice (Figure 3D).

In the intraoperative period, this patient also had a cardiorespiratory arrest that was satisfactorily managed according to what is recommended by the literature [5]. The patient recovered well from anesthesia and surgery and was discharged from the hospital

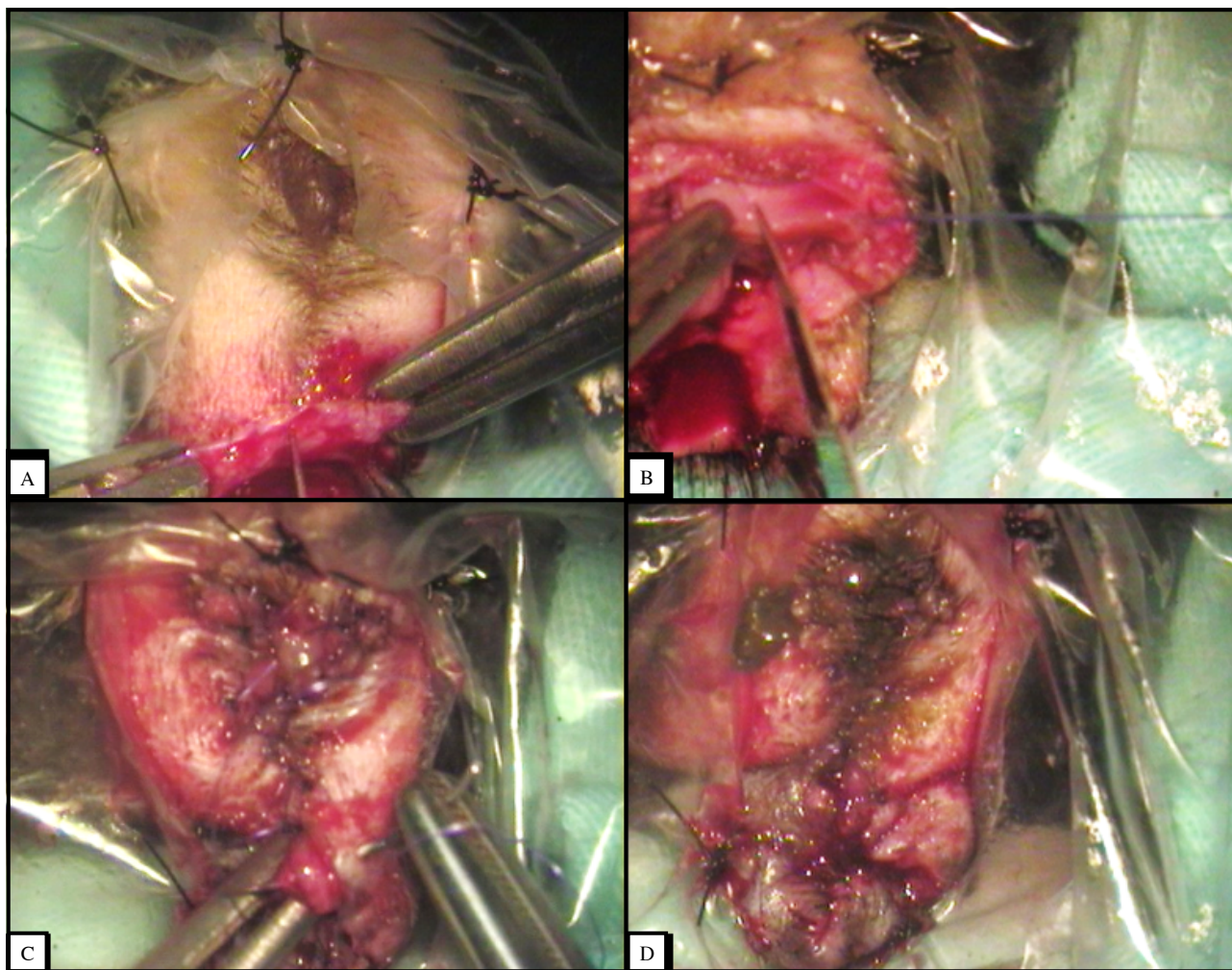


Figure 3. Case 2: Bitch with type III anal atresia associated with rectovaginal fistula treated by microsurgery. A- Episiotomy for access to the rectovaginal fistula. B- Positioning of retaining sutures and incision of the occluded rectum. C- Vaginal reconstruction with isolated sutures. D- Final aspect, with fecal elimination, after anoplasty with 360° mucocutaneous suture to correct anal atresia.

after 24 h with the use of analgesics and laxatives. The surgical area showed dehiscence of some points in the vulvar region treated conservatively. Two sessions of hyperbaric oxygen therapy at a pressure of 2 ATA for 30 min were associated with the treatment, with an oxygen concentration close to 100%. The patient was clinically stable after 210 days of surgical correction, with partial fecal continence. The vulva was partially incomplete in the dorsal region, with a sporadic accumulation of feces in the coat that covers it (Figure 2B).

The bitch returned 250 days after the surgery with an increase in vulvar volume, which was diagnosed as vaginal prolapse type III with a ring-shaped mass projected through the vulva (Figure 2C). Initially, videolaparoscopic ovariectomy associated with clinical therapy with the use of prednisolone was performed. Manual prolapse reduction was unproductive. A tie-over type bandage was applied over the region in order

to avoid lesions to the vaginal mucosa. There was a significant partial reduction of the prolapse without complete resolution (Figure 2D). Thus, 66 days after ovariectomy, the patient underwent a vaginal resection associated with vulvoplasty (Figure 2E). There was good postoperative recovery, with excellent tissue healing. After 83 days of the last surgical intervention, the patient was stable, with no changes in urination, fecal continent and with a good aesthetic appearance in the vulvar region (Figure 2F). At 900 days of follow-up, there are no reports of complications.

DISCUSSION

Both patients had type III anal atresia, as described by Vianna & Tobias [14] and Case 2 presented a rectovaginal fistula associated with the condition. The clinical signs observed converge with the literature, with the distended abdomen and the absence of

defecation as the main evidence [3,6]. In bitches with rectovaginal fistula, vulvar irritation and cystitis may occur due to the presence of feces [6]. According to Ellison & Papazoglou [4], the treatment of choice for cases of anal atresia is surgical and the prognosis is reserved due to postoperative complications.

There are several techniques for surgical correction of anal atresia, mainly based on anoplasty. The greatest difficulty is the presence of delicate tissues and impaired visualization due to the location of the blind end of the rectal pouch within the pelvic cavity [4]. The use of a surgical microscope in anal atresia surgeries is not reported, however, microsurgery can assist in several surgical cases especially in complex locations where greater manual precision is required [11]. The use of optical magnification in anal atresia surgery circumvented the difficulty of visualization, allowing safe manipulation of the tissues, preservation of the anal sphincter, and precision in the mucocutaneous suture. For such benefits, the use of a surgical microscope in veterinary medicine is on the rise, allowing the surgeon to carry out procedures considered to be of great difficulty [8,9].

Anal stenosis and the development of fecalomas are reported complications and contribute to an unfavorable prognosis for patients [6,12]. Enema and anal dilation with an endotracheal tube balloon proved to be conservative alternatives for the treatment of complications to avoid surgical reintervention. The use of specific balloons for this purpose has already been described [4].

The use of a cystoscope ensured greater safety by allowing the video-assisted removal of feces from the rectal ampulla and descending colon, avoiding lesions to the mucosa or rectal perforations. Although authors indicate that accumulation of feces occur due to the introduction of solid food in the puppy's diet resulting in its intestinal deposition [3], the patient in *Case 1* was still exclusively breastfeeding.

As cited by García-González *et al.* [6], it is common for patients to die before treatment. In both cases, the patients had cardiorespiratory arrest during their treatments and, although extremely unfavorable, it was possible to reverse the condition following the

recommended brain-cardio-pulmonary resuscitation [5]. This demonstrates that even in pediatric patients there is a possibility of managing serious complications.

Hyperbaric oxygen therapy (HBOT) consists of offering 100% oxygen in pressurized environments. Thus, with the action of several physical laws, HBOT causes tissue hyperoxygenation, stimulation of fibroblast angiogenesis and proliferation and is recommended for tissue injuries [2]. It is also associated with antioxidant and inflammatory responses [13]. HBOT is considered safe and tolerable for use in dogs and cats [1], presenting no complications and helping in the recovery of the patient in *Case 2*.

Although the etiology is unknown, vaginal prolapse occurs most often in the follicular phase of the reproductive cycle [13,16]. The patient presented signs of heat when the vulvar disorder started, indicative of proestrus, although she did not undergo vaginal cytology. The authors believe that the vulvar malformation associated with proestrus facilitated the occurrence of a vaginal prolapse type III unresponsive to conservative therapy. This is the first report of vaginal prolapse in a female dog with anal atresia.

The microsurgical technique proved to be excellent for correction of type III anal atresia in 2 young and considerably small dogs, including the occlusion of a rectovaginal fistula. Postoperative complications such as dry fecal content and anal stenosis were amenable to conservative management. HBOT is an alternative adjunctive treatment for postoperative complications in puppies. As we observed in both cases, microsurgery presents itself as an indicated tool for the anal reconstruction of patients with atresia as it allows an excellent definition of the dissection and synthesis plans.

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