INTRODUCTION

Ovarian enlargement is common in mares (Westermann et al., 2003) and can have a neoplastic or non-neoplastic origin (Nie and Momont, 1992). Anovulatory follicles are the most common cause of non-neoplastic enlarged ovaries (Frazer and Threlfall, 1986). Other non-tumoral causes of enlarged ovaries are the presence of an ovarian abscess (Ramirez et al., 1998; Lefebvre et al., 2005), an ovarian hematoma (Curtin, 2003; Lefebvre et al., 2005) and/or an ovarian torsion (Sedrish et al., 1997; Lefebvre et al., 2005). Equine ovarian tumors are uncommon (Sundberg et al., 1977). These tumors consist of about 5% of all equine neoplasms (Pugh et al., 1985). Neoplastic enlargement can be due to tumoral transformation of any tissue type located within the ovary or can be due to metastasis in the ovary of tumors that originate in other body locations (McCue et al., 2006).

To diagnose an ovarian neoplasm, it is important to perform a physical examination of the mare including a rectal palpation and an ultrasonographic examination of the ovaries. Observation of the mare’s behavior and a hormone analysis can be very helpful. If an ovarian tumor is diagnosed, a surgical intervention is generally required (Montavon, 1994; McCue, 2000). Histopathological examination of the removed ovary or an ovarian biopsy gives the final diagnosis.

OVARIAN TUMORS

Ovarian tumors are rarely observed in domestic animals (MacLachlan, 1987; Sforna et al., 2003). In the mare, the cow and the ewe, ovarian tumors appear usually unilateral and they are most frequently of a gonadal-stroma type, whereas ovarian tumors in the bitch are usually bilateral and of an epithelial type (Sforna et al., 2003). Of all genital tumors in the mare, the ovarian tumors and tumors of the external genitalia are most common. Tumors of the mammary gland, the vagina, the cervix, the uterus and/or the oviducts are uncommon (McCue, 1998). In general, the incidence of reproductive tract neoplasia in the mare increases with advanced age (McCue, 1998).

The most common neoplasia of the equine ovary is a granulosa cell tumor (Panciera et al., 1991; Montavon, 1994; McCue, 2000; McCue et al., 2006). Several other ovarian tumors have been reported as well as metastases of tumors in the ovary and associations of different types of ovarian tumors (Table 1).

Ovarian teratomas are often named dermoid cysts (Hertzberg and Kliewer, 1996; Caspi et al., 2002; Oliveira et al., 2004). Fujimoto and Sakai (1955) referred to dermoid cysts as a simple form of teratoma that can occur in almost any place, but most commonly in the ovary. The term dermoid cyst, or originally named kyste dermoid, was first used by Leblanc in 1831 to describe an ectodermal cyst in an equine skull.
(Matz, 1961). The application of the term dermoid or “structure which contains only ectoderm elements” for a tumor originating from all 3 germ layers is incorrect and was already outdated in 1961 according to Matz (1961). Smith et al. (1972) referred to dermoid cysts as a special kind of teratoma in which cystic cavities can be found lined with skin and filled with hair. Nezhat et al. (1999) used the word dermoid cyst as a synonym for a benign cystic teratoma. In human literature dermoid cysts are often used as a synonym for mature cystic teratomas but according to Outwater et al. (2001) it is more appropriate to use the term mature cystic teratoma. The word teratoma is derived from the Greek words teraton, meaning monster, and onkoma meaning swelling (Hamilton et al., 2006; Adkins et al., 2008). According to Hamilton et al. (2006), teratoma or ‘monstrous tumor’ was first used by Virchow in 1863.

**Etiology**

There have been a number of theories of the origin of (ovarian) teratomas (Smith et al., 1972). The cell(s) causing a teratoma are dedicated to its/their special purpose at an extremely early stage of the fetal or embryonic development. This can be concluded because teratomas are usually composed of tissues derived from more than one of the primary germ layers and they are generally discovered in young individuals. The fact that teratomas are usually located in tissues of the embryo close to the median axis might be the result of an abnormal development in the germinal streak (Smith et al., 1972). An other theory is that ovarian teratomas are caused by an abnormal development of a primary oocyte that is retained inside the ovary (Deka et al., 1990).

The most accepted theory in human literature to explain the presence of an ovarian teratoma is the parthenogenetic activation of oocytes (Linder et al., 1975; Oliviera et al., 2004). Parthenogenesis or ‘procreation without the immediate influence of a male’ was introduced and defined by Richard Owen in 1849 (Mittwoch, 1978). According to Gurfeld and Benirschke (2003) this theory about parthenogenesis can also be implemented on equine teratomas. Several other modes of origin have been postulated, such as mitosis after the fusion of germ cells (Joseph and Vogt, 1973), failure of meiosis I or fusion of the first polar body with the oocyte, failure of meiosis II or fusion of the second polar body with the ootid, endoreduplication of the genome of a mature ovum, failure of meiosis I and II in a primordial germ cell, fusion of two ova (Chakravarti et al., 1989), incomplete twinning, derepression of totipotent genetic information in the nuclei of somatic cells and neoplastic proliferation of primordial germ cells and sequestered totipotent blastomeres (Scully, 1979; Gonzales-Crussi, 1982).

**Pathophysiology and occurrence**

A teratoma can be qualified as a true tumor, because of its ability to grow in both malignant and benign direction (Willis, 1951). This tumoral expansion can occur fast or slowly, but in most cases teratomas...
grow very gradually, resulting in a long pre-symptomatic period (Smith, 1972).

Teratomas are composed of totipotential germ cells (Kennedy and Miller, 1993). These germ cells undergo somatic differentiation in 2 or 3 germinal or embryonic cell layers (Moulton, 1978; Kennedy et al., 1998; Chen et al., 2003), which give rise to multiple tissues foreign to the organ in which they arise (Frazer et al., 1988; McEntee 1990; Kennedy et al., 1998). Teratomas are benign, hormonally inactive (Frazer and Threlfall, 1986; Frazer et al., 1988; McEntee, 1990; Montavon, 1994; McCue, 1998) and they can be composed of a great variety of tissues, such as cartilage (Moulton, 1978; Panciera et al., 1991; Vortmeyer et al., 1999; Chen et al., 2003), bone (Moulton, 1978; Panciera et al., 1991; McCue, 2000; Chen et al., 2003), hair (Moulton, 1978; McCue, 2000; Chen et al., 2003), skin (Moulton, 1978) with sebaceous glands (Vortmeyer et al., 1999), respiratory mucosa (Panciera et al., 1991), teeth (Moulton, 1978; Panciera et al., 1991; Chen et al., 2003), nervous tissue (Panciera et al., 1991) and muscle (Moulton, 1978; McCue, 2000).

In veterinary literature, teratomas are considered to be solid or cystic (Montavon, 1994; Moulton, 1978). In human literature, teratomas are divided into immature teratomas, mature cystic teratomas (dermoid cysts) and monodermal teratomas (Outwater et al., 2001). Chen et al. (2003) use another classification. They divide teratomas into mature (benign/solid or cystic) or immature (benign or malignant/predominantly solid) teratomas with a subdivision of teratomas which are predominantly composed of endodermal or ectodermal elements.

Teratomas in domestic animals are non-secretory and seldom malignant (Nielsen et al., 1976; Montavon, 1994; Lefebvre et al., 2005). Van Camp et al. (1989) and Frazer et al. (1988) presumed that an equine ovarian teratoma could lead to the development of an adenocarcinoma or a teratocarcinoma of the ovary and metastasize to several organs.

Some veterinary authors put forward that in contrast to teratomas in domestic animals, teratomas in humans tend to be malignant (Nielsen et al., 1976; Cantone et al., 2004). In human medicine literature malignant transformation is rare with a rate of 0.17% to 2% (Matz, 1961; Rose et al., 1993; Comerci et al., 1994; Griffith et al., 1995). According to Surti et al. (1990) benign ovarian teratomas are accounting for approximately 11% of all human ovarian tumors.

In mares, teratomas are the second most common ovarian tumors (Pugh et al., 1985) although most of the equine teratomas are noticed in males (Moulton, 1978).

In the mare, a teratoma normally occurs unilaterally with a normal contralateral ovary (McCue, 1998).

According to Moulton (1978) teratomas are most commonly seen in horses of 1 to 5 years old. However, Clark (1975) and Frazer et al. (1988) reported the occurrence of teratomas in mares aged between 3 and 18 years old.

Generally, teratomas occur at the midline and para-axial regions of the body. Only few are found in the retroperitoneal region and anterior mediastinum, but most often they are diagnosed within the testicle or ovary because of their germ cell origin (Smith et al., 1972; Crum, 1999; Lefebvre et al., 2005). Tests and ovaries develop in a similar way until about the fourth month of the embryonic life. Therefore it is common to see tumors in testicular tissue also appearing in the ovaries and vice versa (Chen et al., 2003). Teratomas are the most common testicular neoplasm in young stallions of 1 to 2 years old. Testicular teratomas are mostly associated with cryptorchid testis and are usually the cause of a retention of the testis rather than the result of it (Stick, 1980; Pratt et al., 2003). A teratoma and even a teratocarcinoma have been reported in the placenta of a horse (Gurfield and Benirschke, 2003; Allison et al., 2004). Teratomas are considered to be extremely rare in other animals than the horse (Nielsen and Kennedy, 1990; Kennedy and Miller, 1993), even though some cases of teratomas have recently been published in dogs (Headley et al., 2006; Wong et al., 2007), cats (Basaraba et al., 1998) and even in a giraffe (Murai et al., 2007).

Symptoms

Generally, an ovarian teratoma in the mare does not interfere with the general health status, and in particular with the fertility status, of the mare (Montavon, 1994) because teratomas are not hormonally secretory. Therefore the contralateral ovary remains functional and the mare shows normal estrus cycles (Panciera et al., 1991; Montavon, 1994; Lefebvre et al., 2005).

Nevertheless symptoms can develop as a result of an expansive growth of the ovarian tumor resulting in pressure symptoms, abdominal pain (colic) and adhesions of the tumor to surrounding structures; it can even affect fertility indirectly (Abraham, 1968; Hovell and Hignett, 1968; Pugh et al., 1985; Frazer and Threlfall, 1986).

Diagnosis

The majority of ovarian abnormalities require a minimum of clinical non-invasive examination and tests to diagnose and differentiate these ovarian abnormalities and/or enlargements (McCue, 2000).

Most of the time, teratomas in horses are diagnosed coincidentally during a routine rectal palpation, at slaughter or during a routine physical examination (Hovell and Hignett, 1968; Pugh et al., 1985; Panciera et al., 1991; Montavon, 1994). Transrectal palpation can reveal a change in ovarian size and/or changes in consistency (Catone, 2004).

An equine ovary of more than 10 cm or less than 2 cm may be pathological and should attract the attention of the clinician (Bosu and Smith, 1993).

An ultrasonographic examination is necessary to differentiate between ovarian tumors and other large non-tumoral structures (Montavon, 1994; Basaraba et al., 1998). Ultrasonographic characteristics of terato-
mas may mimic those of granulosathecal cell tumors, unless the tumor contains highly echogenic components, such as bone or teeth (Blanchard et al., 2003). Teratomas, in comparison with granulose theca cell tumors, are tumors with a variety of mature tissues arranged at random throughout the tumor (Kennedy and Miller, 1993; Lefebvre et al., 2005).

To make a final and accurate clinical diagnosis, it is important to have a complete reproductive history of the mare together with a series of transrectal and ultrasonographic examinations. They are necessary to evaluate ovarian changes during a certain period and to prevent the removal of a healthy ovary in the first place (Frazier and Threlfall, 1986; Lefebvre et al., 2005). Laparoscopic or exploratory laparotomy has also been reported to be useful in the diagnosis of ovarian tumors (Fischer et al., 1986; Basaraba et al., 1998).

After the removal of the affected ovary, it is important to perform a histopathological examination of the ovarian tissue for a final, accurate diagnosis (Lefebvre et al., 2005).

Ultrasound, computer tomography and magnetic resonance are the imaging tools in human medicine to differentiate and to diagnose ovarian teratomas (Buy et al., 1989; Hertzberg and Kliewer, 1996; Outwater et al., 2001).

Treatment

The recommended treatment for ovarian tumors is surgical removal (Bosu et al., 1982). Surgical removal in equines consists of ovariectomy (Tseng et al., 1996; Ayhan et al., 2000). Unilateral or bilateral ovariectomy is a relatively common surgical procedure in the mare with various surgical approaches, such as the ventral midline approach, the paramedian approach (standard or oblique), the paralumbar approach, colpotomy and the laparoscopic techniques through a flank approach in standing or recumbent mares (Slone, 1988; Loesch and Rodgerson, 2003; Gomez et al., 2006). The surgical approach generally depends on the size of the affected ovary, the surgical equipment available, the surgeon’s preference and the temperament and size of the mare (Ragle et al., 1996; Loesch and Rodgerson, 2003, Gomez et al., 2006).

Recently, equine laparoscopic techniques in standing or recumbent mares have become common procedure (Fischer, 1991; Ragle et al., 1996; Hanson and Galuppo, 1999; Smith et al., 2005; Lee and Hendrickson, 2008). Different laparoscopic techniques have been described for hemostasis and ligation of the mesovarium after ovariectomy. In the first case report, Hand et al. (2002) used a vessel-sealing device ( LigaSure Atlas®, Valleylab, Colorado, USA). However, the removal of large ovarian tumors (> 10cm) can be difficult because of multiple problems as problems with the exposure of the ovarian tumor, pain associated with traction and/or manipulations and increased blood supply (Doran et al., 1988; Ross, 1991). Standing, hand-assisted, laparoscopic ovariectomy (Rodgerson et al., 2002; Gomez et al., 2006), aspiration of cystic fluid to reduce the size (Gomez et al., 2006), the sterile plastic bag technique or ovarian removal under general anesthesia (Seltzer and Yarbrough, 1998; Gomez et al.; 2006) can help to overcome some of those problems.

Prognosis

The prognosis of a teratoma is generally good because of the benign characteristics of the tumor. However it is advisable to remove the affected ovary (Bosu et al., 1982; Pugh et al., 1985). Ovariectomy in the mare has a good prognosis although some complications may occur, such as ligature slippage (Rodgerson and Hanson, 2000), hemorrhage (Slone, 1988), infection (abscedation) of the wound as described in the first case, wound dehiscence, herniation, hematoma or seroma formation, peritonitis, post-operative diarrhea, shock, death and general problems in relation to general anesthesia and recovery in horses (Meagher et al., 1977).

Laparoscopic ovariectomy in standing mares has a good prognosis with few reported complications (Hanson and Galuppo, 1999; Hand et al., 2002; Lee and Hendrickson, 2008). The advantages of this laparoscopic technique are small surgical incisions (Coke-laere et al., 2005; Lee and Hendrickson, 2008), a reduction of complications as a result of the improved visualization of the operative field (Hanson and Galuppo, 1999; Rodgerson et al., 2001), a tension-free ligation (Rodgerson et al., 2001), no need for general anesthesia (Dechant and Hendrickson, 2000), decreased surgical and postoperative morbidity (Smith et al., 2005; Dechant and Hendrickson, 2000) and a shortened post-operative recovery time (Sutter and Hardy, 2004). Disadvantages of the laparoscopic ovariectomy are the requirement and the cost of special equipment and an appropriate surgical training (Hanson and Galuppo, 1999; Rodgerson et al., 2001; Smith et al., 2005).

CASE 1

A 4-year-old Belgian Warmblood mare suffering from colic was presented to the clinic. The day before, the mare received a spasmolytic agent (Butylhyoscine Bromide, Buscopan® compositum ad us. vet., Boehringer Ingelheim, Brussels, 0.2 mg/kg BW IV) which improved her condition and appetite. The following morning the mare developed symptoms of colic again after being fed. The mare went through a general health examination. The temperature of the mare was 37.9 °C, the pulse rate was 44b/minute and the respiratory rate 24/minute. The mucosae were pink with a normal capillary refill time (< 2 seconds). The body condition and skin turgor were normal and no swelling of the lymph nodes was noticed. The auscultation of the heart, thorax and lungs was normal. The auscultation of the abdomen revealed reduced borborygmi at the left side and normal borborygmi at the right side. She responded normally to the lumbar reflex test. A
blood gas analysis (venous) revealed a BE (base excess) of 0.5 meq/liter and packed cell volume of 38%. Transabdominal ultrasound of the abdominal cavity could not visualize any abnormality. Rectal palpation revealed the presence of dry feces and a firm flexura pelvina impaction. The mare was treated with paraffin oil and sulphates. She was kept under surveillance. During the night, the mare became colicky again and was treated with flunixin meglumine (1.1 mg/kg, intravenously (IV), Finadyne®, Schering Plough, Belgium). The next day the feces passage returned to normal. The impaction resolved by the third day, but rectal palpation at that time revealed a large solid mass central in the abdomen. Initially, the mass was presumed to be a remnant of the impaction or an enterolith and therefore paraffin oil was administered again. Two days later, the large solid mass was still present and was clearly originating from the left ovary. The right ovary appeared normal in size and consistency. Transrectal ultrasonography (7.5 MHz, MayLab30®, Esaote Pie Medical, Zaventem, Belgium) of the left ovary revealed a large anechogenic cyst with large blood supply to the wall. The mare was prepared for surgery and a 12-gauge-IV-catheter (Intraflon 2 catheter 12G/80mm) was placed in the jugular vein. The mare was sedated with detomidine (6 µg/kg.hr) and hemofiltration infusion (1-2 drops/sec). The mare was placed in stocks and the incision. The mare received flunixin meglumine (1.1 mg/kg IV) and methadone (0.1 mg/kg, IV, Mephenon). During surgery she received a continuous antibiotics (1-2 drops/sec). The mare was placed in stocks and the incision. The mare received flunixin meglumine (1.1 mg/kg IV) and methadone (0.1 mg/kg, IV, Mephenon). During surgery she received a continuous intramuscular [IM], Neopen®, Intervet, Belgium) and methadone (0.1 mg/kg, IV, Mephenon). During surgery she received a continuous intravenous [IV], Neopen®, Intervet, Belgium) of the left ovary revealed a large anechogenic cyst with large blood supply to the wall and a capsule like structure. With a presumptive diagnosis of an ovarian tumor, a laparoscopic ovariectomy in the standing mare was recommended.

**Operation**

The mare was fasted for 48 hours before surgery and neomycin sulfaprocaine penicillin G (1 ml/20kg, intramuscular [IM], Neopen®, Intervet, Belgium) and flunixin meglumine (1.1 mg/kg IV) were administered 12 hours before surgery.

The mare was prepared for surgery and a 12-gauge-IV-catheter (Intraflon 2 catheter 12G/80mm) was placed in the jugular vein. The mare was sedated with detomidine hydrochloride (10 µg/kg, IV, Domosedan®, Pfizer A.H., Belgium) and methadone (0.1 mg/kg, IV, Mephenon). During surgery she received a continuous detomidine (6 µg/kg.hr) and hemofiltration infusion (1-2 drops/sec). The mare was placed in stocks and the left flank was clipped and aseptically prepared for surgery using hibitane (Hibiscrub®) and alcohol (Antiseptische oplossing Stella®, Laboratoires Lohmann & Rauscher s.a., Liège). The left paralumbar fossa was locally infiltrated with 20 ml of 2% meipivacain hydrochlorid (Scandicaine, Astra Zenecan, Belgium) before surgical draping.

Three portal sites (10-15 mm) were made. The first dorsal to the crus of the internal abdominal oblique muscle, midway between the last rib and tuber coxae, the second about 9 cm distally and a third portal site more proximally between the 17th and 18th rib. In each portal site a 10-mm-diameter and 20-cm-long laparoscopic cannula (Laparoscopic cannula, Wolf Richard, Drongen-Ghent, Belgium) was inserted and the most cranial portal site was used for the laparoscope. After insufflation of the abdomen with carbon dioxide gas, the severely enlarged left ovary (> 30 cm diameter) was visualized. The insufflation was stopped when sufficient visualization was achieved or when the mare began to show mild signs of abdominal discomfort. A self-made laparoscopic injection needle was inserted through an instrument portal to infiltrate the ovarian pedicle with 30 ml 2% xylocaine. While waiting for an effective local anesthesia of the pedicle, ca. 3.5 liters of serosanguinuous fluid were retrieved from the ovarian cysts, thus reducing the volume of the tumor. Even though the ovary was still too large to allow normal laparoscopic dissection, the flank incision was enlarged to perform a hand-assisted laparoscopy.

After local anesthesia, the mesovarium was coagulated and cut by use of a bipolar vessel-sealing device (LigaSure Atlas®). The ovarian tumor was removed through the enlarged flank incision. The skin incisions were closed in several layers using absorbable sutures.

**Post-operative treatment**

After surgery, the mare was treated with 60 ml gentamicin sulfa (Emdogent®, Emdoka, Hoogstraten) and 10,000,000 IU benzylpenicillin natrium (benzylopenicillin natrium, Kela) during 5 days. Post-operative monitoring included the assessment of the appetite, the measurement of the rectal temperature, respiration rate, pulse rate and the inspection of the wound once a day.

The following days the mare was treated with 30 ml Procain Penicillin G - Neomycin (Neopen®, Intervet, Meehelen). She also received analgetics (Finadyne®, Schering Plough, Heist-op-den-Berg).

Five days after surgery, edema appeared decline to the incision. The mare received flunixin meglumine (Finadyne®, Schering Plough, Heist-op-den-Berg) 1.1 mg/kg BW IV. Two days later, the swelling was still present and the mare became febrile (38.3°C). An ultrasound of the wound was performed and 2 small abscesses (2-3 cm) were discovered. Serohemorrhagic fluid was punctuated out of the abscess and brought to the laboratory for analysis. The results showed a white blood count (WBC) of > 100 000 WBC/mm³ and the presence of a DNAase negative staphylococcus with bacteriological resistance against penicillin. Incisional complication is a common sequela to a hand-assisted laparoscopy (Rodgerson et al., 2002; Cokelaere et al., 2007).

The following days, the mare was treated with trimethoprimum + sulfadiazinum natrium (Emdotrim 60% mix, Emdoka, Hoogstraten) 30 g per os. Another rectal examination was performed but no adhesion or hernia could be found, only a strong reaction of the abdominal muscles was observed. The wound healing improved only 4 days later. During a control ultrasound examination of the wound, a large abscess was found. It was punctuated and sutures were removed. The abscess was drained and flushed.

After 14 days, the wound healed almost completely and the mare went home. She was kept under trimethoprimum + sulfadiazinum natrium (Emdotrim 60% mix, Emdoka, Hoogstraten) 30 g orally for 7 days. A total rest of six weeks after the operation was advised.
Gross pathology

The removed ovary was irregular, ovoid and grayish-white colored with yellow zones. The ovary weighed more than 2.7 kg and measured about 30 cm in diameter after fluid drainage. After overnight freezing, several macroscopic tumor slices were made. They allowed the differentiation of hair, cartilage, cyst-like structures filled with a viscous dark red, almost black fluid and other less definable soft tissues (Figure 1).

Histopathology

Several samples were randomly taken and fixed in formaldehyde 4% for histopathological examination. The presence of connective tissue, mucinous stroma, degenerating fibroblasts and multiple cavernous holes surrounded by a cubic epithelium and filled with eosinophilic material containing cholesterol crystals were found together with multiple cartilage-islands and tissue analogous to dermis covered by a stratified squamous epithelium (analogous to the epidermis). Hair follicles, sebaceous glands, sweat glands and musculi arrector pili could also be identified in the dermis-like tissue. The underlying tissue, which resembles subcutaneous tissue, contained a piece of cartilage (Figure 2).

Radiology

Radiography revealed a soft tissue mass containing calcified areas (Figure 3).

CASE 2

The second teratoma described in this paper was found by accident in the ovary of a slaughtered mare. The mare’s ovaries were gathered for oocyte collection.

Gross pathology

The ovary was ovoid and had a yellow-beige color; it felt very solid and was of normal size (9 x 5 cm). The ovary was sliced lengthwise in 3 equal parts. Bone or cartilage-like structures were seen in the entire ovary (Figure 4).

Histopathology

Four samples of the ovary were taken at random. Each sample was fixed in formaldehyde 4% and sent for histopathological examination. The tumor consisted of well-differentiated dense collagen fibers containing large arteries with sclerotic walls and poor to strong mineralized bone trabecles, tissue composed of accumulated spindle cells with spindle shaped nucleus and eosinophilic cytoplasm, excrescence of epithelium giving shape to lobuli and tubuli containing a central accumulation of a fluid rich in protein.

Radiology

Radiography revealed a soft tissue mass containing calcification areas (Figure 5).

CONCLUSION

As second, most common equine ovarian tumor, an ovarian teratoma, has to be considered in the differential diagnosis of mares with ovarian enlargement(s) (Pugh et al., 1985).

Even though ovarian teratomas are benign in
horses, ovariectomy is the recommended therapy (Bosu et al., 1982; Pugh et al., 1985). Although the normal laparoscopic technique allows the removal of very large ovarian tumors with the aid of suction, electrosurgery (Ligasure Atlas®) and retrieval bags (Lloyd et al., 2007), the ovary described in case report 1 was extremely large and heavy and in the surgeon’s opinion, a hand-assisted technique would allow easier and faster surgery.

In the first case it’s difficult to tell whether the presence of the flexura pelvina impaction and the colic symptoms on the one hand and the presence of the teratoma on the other were merely coincidental. It can be presumed that the teratoma had a very gradual growth and that its diagnosis was accelerated by the multiple rectal palpations because of the colic.

For an accurate diagnosis and treatment of ovarian enlargements it is important to take into account the temperament of the mare, the demands of the horse owner, the surgical accommodation and the type of tumor or enlargement.

For a final diagnosis, histopathological examination of different samples of the removed ovary is crucial.

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