












## Leiomyosarcoma associated with acute abdomen and uterine torsion in a white-collared peccary (*Tayassu tajacu*)

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**ABSTRACT.**- Melo E.T., Lima T.S. Bom H.A.S.C., Silva-Filho G.B., Fonseca S.M.C., Santos J.R.P., Andrade A.C., Lima P.A.C.P., Evêncio-Neto J. & Mendonça F.S. 2024. **Leiomyosarcoma associated with acute abdomen and uterine torsion in a white-collared peccary (*Tayassu tajacu*).** *Pesquisa Veterinária Brasileira* 44:e07442, 2024. Laboratório de Diagnóstico Animal, Universidade Federal Rural de Pernambuco, Rua Dom Manoel de Medeiros s/n, Dois Irmãos, Recife, PE 52171-900, Brazil. E-mail: [fabio.mendonca@ufrpe.br](mailto:fabio.mendonca@ufrpe.br)

This study aimed to report a leiomyosarcoma associated with acute abdomen and uterine torsion in an 8-year-old, nulliparous, white-collared peccary (*Tayassu tajacu*) kept under human care. The animal presented a two-day clinical history of abdominal bulging, vaginal discharge, and acute abdomen. Ultrasound findings indicated an intrabdominal tumor, and an exploratory laparotomy followed by an emergency ovariohysterectomy was performed to remove the tumor. Grossly, the right horn exhibited a firm, friable tumor measuring 23cm in diameter and weighing 9.3kg. On the cut surface, the tumor drained a foul-smelling fluid and bloody content. The tumor wall was 6cm thick, dark red, firm, and had a brittle, soft, yellow fibrillar material firmly adhered to its surface. Microscopically, the lesion consisted of malignant proliferation of leiomyocytes with necrosis and hemorrhage of the endometrium and myometrium. The cytoplasm of the neoplastic cells was strongly immunopositive for vimentin and smooth muscle actin but negative for cytokeratin and desmin. Leiomyosarcoma is uncommon in Tayassuidae, and its clinicopathological presentation may be concomitant with acute abdomen, uterine torsion, and pyometra. These conditions should be included in the differential diagnosis of reproductive diseases observed in female peccaries.

**INDEX TERMS:** Leiomyosarcoma, uterine neoplasia, sepsis, smooth muscle actin, white-collared peccary, *Tayassu tajacu*.

**RESUMO.**- [Leiomiossarcoma associado a abdome agudo e torção uterina em uma cateta (*Tayassu tajacu*)] Este estudo teve como objetivo relatar um leiomiossarcoma associado a abdome agudo e torção uterina em uma cateta (*Tayassu tajacu*) de oito anos, nulípara, mantida sob cuidados humanos. O animal apresentou uma história clínica de dois

dias de aumento de volume abdominal, secreção vaginal e abdome agudo. Achados de ultrassonografia indicaram um tumor intrabdominal, e uma laparotomia exploratória seguida de ovariohisterectomia de emergência foi realizada para remover o tumor. Macroscopicamente, o corno direito do útero exibia um tumor firme, friável medindo 23cm de diâmetro e pesava 9,3kg. Na superfície de corte, o tumor drenava um fluido de odor fétido e conteúdo sanguinolento. A parede do tumor tinha 6cm de espessura, era de cor vermelha escura e firme, e apresentava um material fibrilar amarelo, friável e macio aderido firmemente à sua superfície. Microscopicamente, a lesão consistia em proliferação maligna dos leiomiócitos acompanhada de necrose e hemorragia difusas de endométrio e miométrio. O citoplasma das células neoplásicas foi fortemente imunopositivo para vimentina

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e actina de músculo liso e negativo para citoqueratina e desmina. Leiomiossarcomas são raros em Tayassuidae e sua apresentação clinicopatológica pode ser concomitante com abdome agudo, torção uterina e piometra. Essas condições devem ser incluídas no diagnóstico diferencial de doenças reprodutivas observadas em catetas.

TERMOS DE INDEXAÇÃO: Leiomiossarcoma, neoplasia uterina, sepse, actina de músculo liso, cateta, *Tayassu tajacu*.

## INTRODUCTION

White-collared peccaries (*Tayassu tajacu*) are mammals classified within the order Artiodactyla and family Tayassuidae, widely distributed across North and South America (Sowls 1997). Due to their prolific reproduction in captivity and low environmental impact compared to semi-confinement systems, white-collared peccaries hold potential for meat and leather production (Nogueira & Nogueira-Filho 2011). Although the meat of these animals is commonly consumed in the northern region of Brazil, the production chain for this resource is not well-established in Latin America (Nogueira & Nogueira-Filho 2011, Hoffman & Cawthorn 2012).

Among the factors compromising Tayassuidae production and impacting animal welfare, reproductive diseases play a significant role. In captive-raised female white-collared peccaries, common reproductive diseases include hydrosalpinx, ovarian hypoplasia, persistent corpus luteum associated with mucometra, pyometra, and ovarian cysts (Batista et al. 2007). Pyometra alone accounted for 2% of *post mortem* findings in this species in northeastern Brazil (Batista et al. 2014). In males, notable testicular lesions such as germinal epithelium degeneration, epithelial rarefaction, and orchitis are observed (Filgueira et al. 2005).

Since the occurrences of neoplasms in Tayassuidae are scarcely documented (Silveira et al. 2022), most references rely on descriptions from pig studies. In pigs, important reproductive neoplasms include leiomyoma, fibroma, cystadenoma, fibroleiomyoma, and carcinoma (Morey-Matamalas et al. 2021). However, reports of malignant uterine neoplasms are rarely described. This study aims to present a case of leiomyosarcoma associated with acute abdomen and uterine torsion in a white-collared peccary (*Tayassu tajacu*) under human care.

## CASE REPORT

**Ethical approval.** All animal procedures were carried out in accordance with the Ethics Committee on the Use of Animals (CEUA) from the “Universidade Federal Rural de Pernambuco (UFRPE).

An 8-year-old female, white-collared peccary (*Tayassu tajacu*), weighing 26kg and presenting a history of vulvar discharge, bulging abdominal region, and pain, was referred for emergency surgery due to acute uterine torsion. The peccary was previously raised as a pet, but it has been sent to a state zoological collection for the past five years. Radiography and ultrasound were performed, and a tumor arising from the uterus and ascites were noted. After performing an exploratory laparotomy, an ovariectomy was performed, and the surgical specimen was sent for pathology examination and

histopathologic workout. Eighteen months after the surgery, the peccary did not present any clinical signs of disease.

Grossly, diffuse distension of the body and uterine horns were observed. The right horn displayed a firm tumor measuring 23cm in diameter and weighing 9.3kg, which led to the loss of the spiral anatomical pattern (Fig.1). Only a portion of the uterine horn kept the anatomical standard. However, after cutting, a purulent content was noticed flowing from its lumen (Fig.2). The serous layer was white to red and presented remarkable engorged vessels. In a focal area of 0.5cm, an ulcerative area was noted. On the cut surface, the tumor drained fetid bloody fluid content. The uterine wall in this area measured 6cm thick, was dark red, firm, and contained a friable, soft, yellow fibrillar material firmly adhered to its surface (Fig.3). After removing this material, the uterine surface displayed multiple tumors varying from 1 to 7cm in diameter. Two standards were noted: intensely dark red and occasionally white, soft and compact (Fig.4). Both types drained discrete bloody material after cutting. The left uterine horn was diffusely dark red and soft, with preservation of the spiral anatomical architecture. The serosa was intensely dark red, with engorged vessels and drained bloody fluid content on the cut surface. The wall was thin and varied from red to black. This region had been incarcerated during the rotation of the contralateral uterine horn. The cervix was brown-red, shiny, and swollen.

Samples of the uterine tumor were fixed in 10% neutral buffered formalin, routinely processed in paraffin wax, and stained with hematoxylin and eosin (HE). Immunohistochemical labeling was carried out for vimentin, smooth muscle actin (SMA), and desmin. The anti-vimentin (1:1000) (RTU, Ventana Medical Systems, Phoenix, Arizona, USA) was run on the Bench Mark autostainer using an Enhanced V Red Detection System (Ventana Medical Systems). Antibodies against SMA (1:50) and desmin (1:400) (Dako, Carpinteria, California, USA) were run on the Bond-Max autostainer (Leica Microsystems GmbH, Wetzlar, Germany) using the Bond Polymer Detection System (Leica Microsystems). All slides were counterstained with Mayer's hematoxylin. Positive controls included normal canine skeletal muscle and small intestine. For negative controls, the primary antibodies were replaced with homologous non-immune sera.

Microscopic examination of the uterus demonstrated an infiltrative and well-vascularized neoplasm in the muscular layer. The neoplasm was composed of poorly differentiated spindle and stellate cells originating from the muscles that were organized in multidirectional bundles and distended the uterine wall (Fig.5). The cells had indistinct borders, marked anisocytosis, anisokaryosis, and scant cytoplasm. The nuclei, whose chromatin was finely granular, varied from round to oval. Their nucleoli were not evident (Fig.6). Between 80% and 90% of the tumor was necrotic and hemorrhagic, and the endometrium was diffusely replaced by neoplastic cells. In the adipose tissue adjacent to the tumor, there was severe congestion and dilation of blood vessels, and numerous bacteria were observed inside and outside the vessels. In addition, there was a neutrophilic infiltrate, mainly perivascular and interspersed with the adipocytes. The cytoplasm of the neoplastic cells was stained strongly immunopositive for vimentin and smooth muscle actin and negative for desmin (Fig.7 and 8).



## DISCUSSION

Leiomyosarcoma is a rare malignant smooth muscle neoplasm in domestic and wild pigs (Batista et al. 2007, Morey-Matamalas et al. 2021). To the authors' knowledge, this is the first report of uterine leiomyosarcoma in a peccary. The clinicopathological presentation of the uterine leiomyosarcoma occurred concomitantly with acute abdomen, pyometra, and uterine torsion. In this case, the peccary survived, but this neoplasm is generally fatal. In women, uterine leiomyosarcomas leads to death due to septic shock and acute immune response secondary to bacterial, viral, or fungal infection, which tends to incite systemic inflammatory response syndrome (Angus & Van Der Poll 2013, Takahashi et al. 2021). In pigs with uterine leiomyoma or leiomyosarcoma, clinical signs consist mainly of abdominal distension, serosanguineous vaginal discharge, and a large abdominal tumor (Munday & Stedman 2002). In these cases, due to the poor clinical prognosis, euthanasia is common.

In women, uterine sarcomas correspond to 1% of all gynecological cancers, and leiomyosarcoma represents explicitly 40% of these lesions (Major et al. 1993, D'Angelo & Prat 2010). In small domestic animals, the most common uterine mesenchymal tumors are leiomyoma, fibroma, and fibroleiomyoma, with leiomyomas of the myometrium being the most common, especially in dogs, cats, and cows; however, leiomyosarcomas are also uncommon in these species (Stein 1981, Whitney et al. 2000, Cooper et al. 2006, Ilha et al. 2010). In one study with female potbellied pigs, 106 animals were evaluated, and uterine neoplasia corresponded to 17 cases. Uterine leiomyoma was diagnosed in 11 cases, and leiomyosarcoma in one case (Mozzachio et al. 2004). This low frequency reinforces the rare occurrence of leiomyosarcomas in wild pigs.

Abdominal leiomyosarcomas are invasive and can become relatively large, resulting in considerable narrowing of the lumen

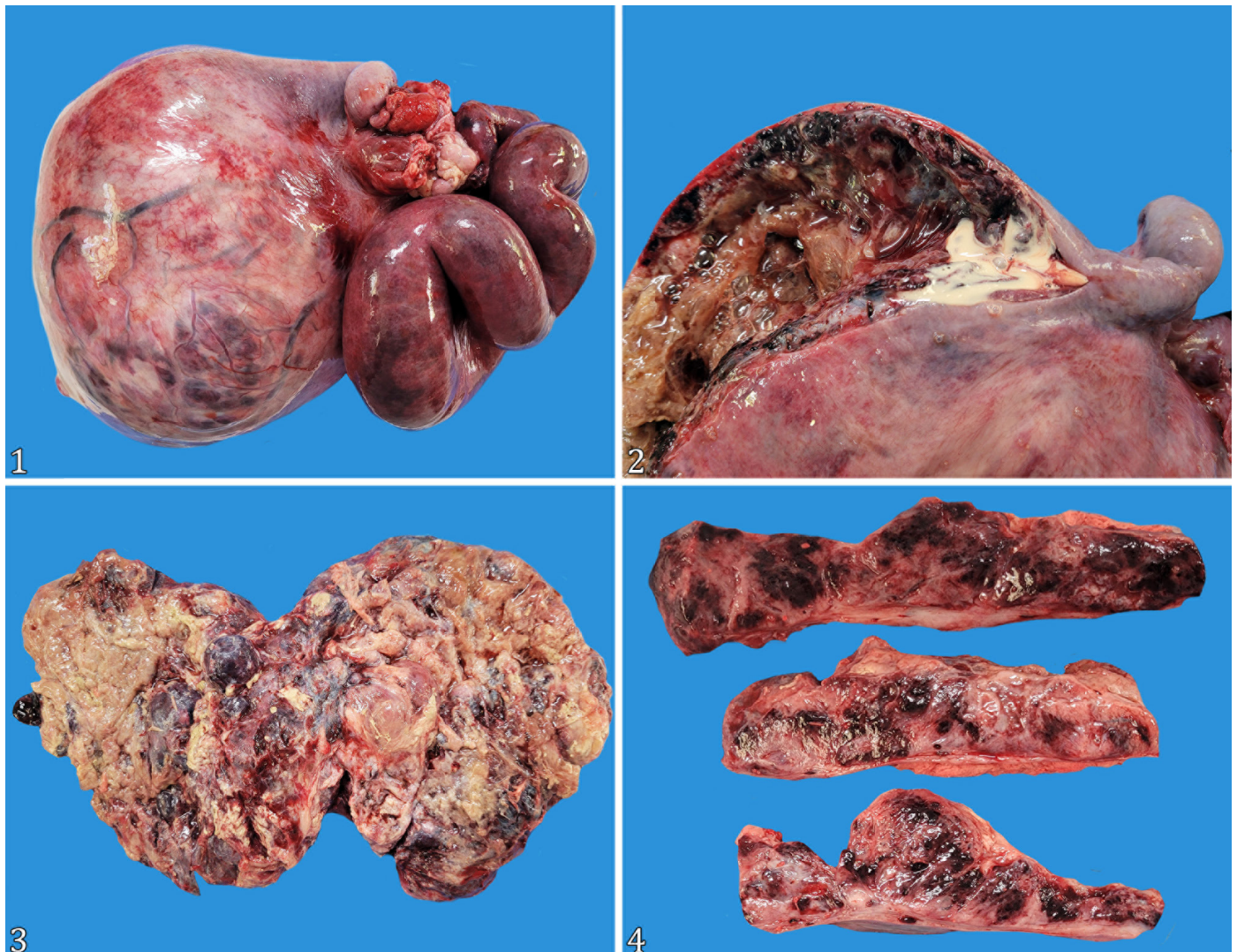


Fig.1-4. Uterine leiomyosarcoma in white-collared peccary (*Tayassu tajacu*). (1) Tumor in the right uterine horn, with marked loss of anatomical pattern. The left uterine horn is distended and has a dark red wall. (2) Infundibulum filled with purulent contents (pyometra). This region was not replaced by the tumor. (3) The inner surface of the uterine tumor. Note diffusely adhered yellow fibrillar material (fibrin) associated with multiple dark red nodular areas. (4) Cut surface of the uterine tumor showing the marked thickening of the uterine wall, whose appearance is firm and compact, with multifocal to coalescent dark red areas.



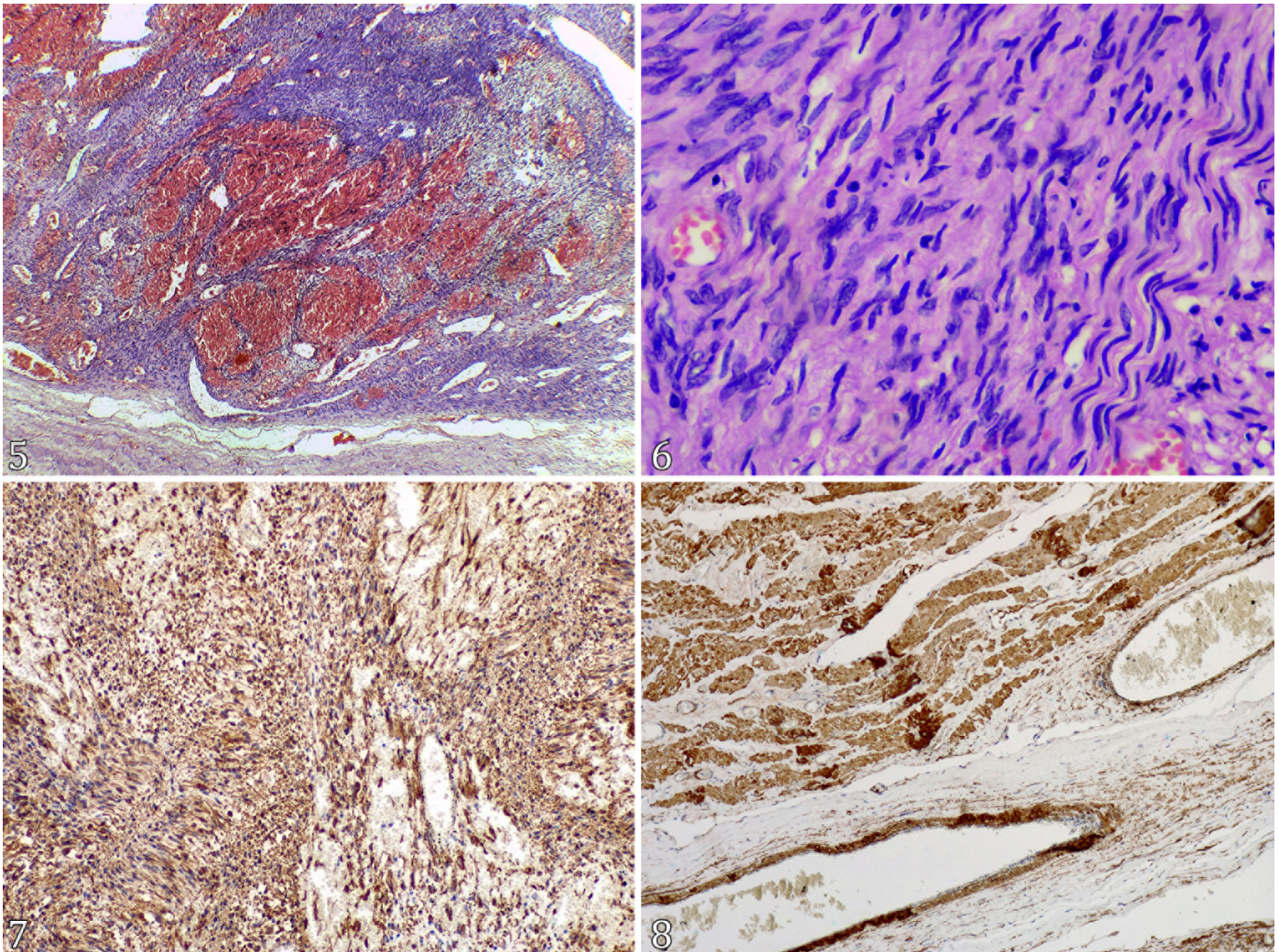


Fig.5-8. Photomicrograph of uterine leiomyosarcoma in a white-collared peccary. (5) Malignant proliferation of leiomyocytes in the myometrium region with hemorrhage. HE, obj.4x. (6) Pleomorphic, small spindle neoplastic cells, organized in short bundles, containing round to oval nuclei and dispersed chromatin. Neoplastic cells have indistinct borders, scant cytoplasm, marked anisocytosis, and anisokaryosis. Note the multidirectional arrangement of muscle fibers. HE, obj.40x. (7) Strong to moderate immunolabelling of vimentin in neoplastic cells. IHC, obj.10x. (8) Strong to moderate immunolabelling of smooth muscle actin in neoplastic cells. IHC, obj.10x.

of the uterus or the affected segment of the intestines, and can compress abdominal viscera. They also can infiltrate, compress, and obliterate vessels, leading to hypoxic injury (Mendonça et al. 2020). The neoplasm was the most likely cause of the uterine torsion and pyometra. Other diseases that occur with an acute abdomen in pigs must be included in the differential diagnosis, such as gastric dilatation, volvulus, porcine intestinal dilatation syndrome, foreign body in the gastrointestinal tract, and uterine leiomyoma (Munday & Stedman 2002, Paladino & Guedes 2011, Batista et al. 2014, Nakamae et al. 2022).

Microscopically, it is difficult to distinguish leiomyosarcoma from other sarcomas (fibrosarcoma, rhabdomyosarcoma, and other undifferentiated sarcomas) solely by examining cellular morphology (Boisclair & Dore 2001, Cecilia et al. 2013, Bodinga et al. 2019, Verma et al. 2019, Stephan et al. 2022). Cell morphology varies from strap-like muscle fibers to rounded anaplastic cells that do not indicate a specific cell lineage. Immunohistochemical analysis is required in such instances to determine the origin of the neoplasm (Birkebak et al. 1996). The uterine neoplasm described

herein was only positive for vimentin and SMA, which allows it to reveal its origin from smooth muscle and distinguish it from other possible mesenchymal tumors previously mentioned. In pet pigs, leiomyoma and leiomyosarcoma were diagnosed in females with cystic endometrial hyperplasia, reinforcing the occurrence of uterine tumors in these animals accompanied by previous chronic inflammatory diseases in the reproductive tract (Augustijn et al. 2010, Wood et al. 2020). In the present case, this lesion was not observed. However, it should be noted that a large area of the endometrium was not preserved due to the severe endometrial necrosis caused by pyometra. This suggests that chronic inflammatory reproductive lesions can be an important cause of uterine neoplasms.

## CONCLUSION

Leiomyosarcoma in *Tayassu tajacu* can appear as an expansive intrauterine tumor with consequent uterine torsion and acute abdomen, pyometra, and septicemia, which may constitute



a clinical emergency. This tumor should be included as a differential diagnosis of mesenchymal neoplasms of the reproductive tract, and smooth muscle actin can be used in its immunohistochemical evaluation of collared peccaries.

**Authors' contributions.**- Melo E.T.: Wrote and revised the manuscript and participated in the entire methodological part. Lima T.S., Bom H.A.S.C., Silva-Filho G.B., Fonseca S.M.C.: Wrote and revised the manuscript. Santos J.R.P., Andrade A.C.: Wrote and revised the manuscript, participated in the entire methodological part. Lima P.A.C.P., Evêncio-Neto J. & Mendonça F.S.: Provided guidance, participated in the delimitation of the study and reviewed the manuscript.

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**Conflict of interest statement.**- The authors declare that there are no conflicts of interest.

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