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Laparoscopic evaluation of macroscopic lesions in the uterus and adjacent tissues in sheep after ovariectomy

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Summary

The aim of the study was the evaluation of post-ovariectomy morphological changes in the ovine uterus and surrounding tissues by diagnostic laparoscopy. After the preparation of ewes and equipment, ports were placed in the abdominal cavity, through which an optic and additional tools were introduced. The exploration and evaluation of the body cavity was performed under direct laparoscopic observation. The results were as follows: out of 7 merino sheep females, massive adhesions were observed in 3 animals, slight fibrous bands between the surrounding tissues in 1, and no adhesions in 2. One, control, sheep was not subjected to ovariectomy. The study indicates that diagnostic laparoscopy is a useful diagnostic tool and should be regarded as a basic method for similar purposes.

Keywords: sheep, laparoscopy, ovariectomy, adhesions

Ovariectomy is a surgical procedure in which gonads are removed by laparotomy, usually by a midline approach. The indications for this surgery are tumors, ovarian cysts, and the desire to eliminate heat or to prevent unwanted pregnancies.

After surgery, postoperative complications may occur, such as adhesions in the area of ligation. In order to evaluate the condition of the body after surgery, abdominal ultrasound examination can be done, but a more accurate diagnosis can be obtained by diagnostic laparoscopy (13, 14).

Laparoscopy is one of the least invasive surgical techniques, in which, the surgeon can observe and examine the organs of the abdomen and pelvis by means of rigid optics (12, 19, 21). Before a laparoscopic examination, one or more small incisions are made in the abdominal wall, and metal ports are inserted. The ports function as working canals for the procedure. Next, pneumoperitoneum is created by pumping CO_2 into the abdominal cavity before optics and auxiliary tools are introduced.

During the examination, the surgeon may examine selected parts of the abdominal cavity and specific areas of organs, collect tissue samples, and take swabs for further examination. The whole procedure may be recorded and pictures may be taken (3, 6).

The main advantage of this technique is that specific organs and tissues can be clearly seen without the need for a large incision. Incisions after laparoscopy are small, and heal quickly. What is more, the recovery of the patient does not take much time (10).

The aim of this study was to observe changes in soft tissues around removed ovaries and to assess adhesions.

Material and methods

The study was conducted on 7 healthy, non-pregnant females of merino sheep. The weight of each sheep was between 50 and 60 kg, and they were about 5-6 years old. Ovariectomy was performed in May 2013. Laparoscopic examinations were conducted 9 months later, in February 2014.

The study was approved by the Animal Ethics and Welfare Committee of the Faculty of Veterinary Medicine at the Wroclaw University of Environmental and Life Science.

All ewes were fasted for 24 h before laparoscopy. The animals were premedicated with medetomidine (1000 mg/m^2, i.m.), midazolam (0.1 mg/kg m.c., i.m.), and ketamine

Fig. 1. Operative field prepared for laparoscopy

Fig. 3. Veress needle insertion – connection to the insufflator cable

(10 mg/kg m.c., i.m.). A general anesthesia was induced by propofol (1 mg/kg, i.v.) and maintained with isoflurane vol.1-1.5% and fentanyl (6 µg/kg/h, i.v.).

The sheep were in dorsal recumbency (supine position), and the surgical field was aseptically prepared before the surgical procedure (Fig. 1). Equipment and instruments necessary to perform laparoscopic operations were used (Fig. 2).

A small cutaneous incision in the midline was made, 5 cm cranial to the umbilicus. A Veress needle was inserted. Pneumoperitoneum to a pressure of 15 mmHg was created (Fig. 3). Once the abdomen had been distended, the Veress needle was removed. The insufflator pipe was disconnected from the needle and connected to a trocar placed at the same site as the needle. An optic was inserted through the same trocar (Fig. 4). Subsequently, the entire abdominal and pelvic cavity was examined. To facilitate the manipulation of an instrument, the second and third trocars were placed, according to the triangle rule. To confirm the presence or absence of adherences and other changes in tissues, abdomi-

Fig. 2. Laparoscopy tower – monitor, light source, CO_2 cylinder, insufflator, laparoscopic instruments (trocars and ports, rigid optic, Veress needle, Backhaus forceps, graspers, and forceps)

Fig. 4. Optic insertion through the main port

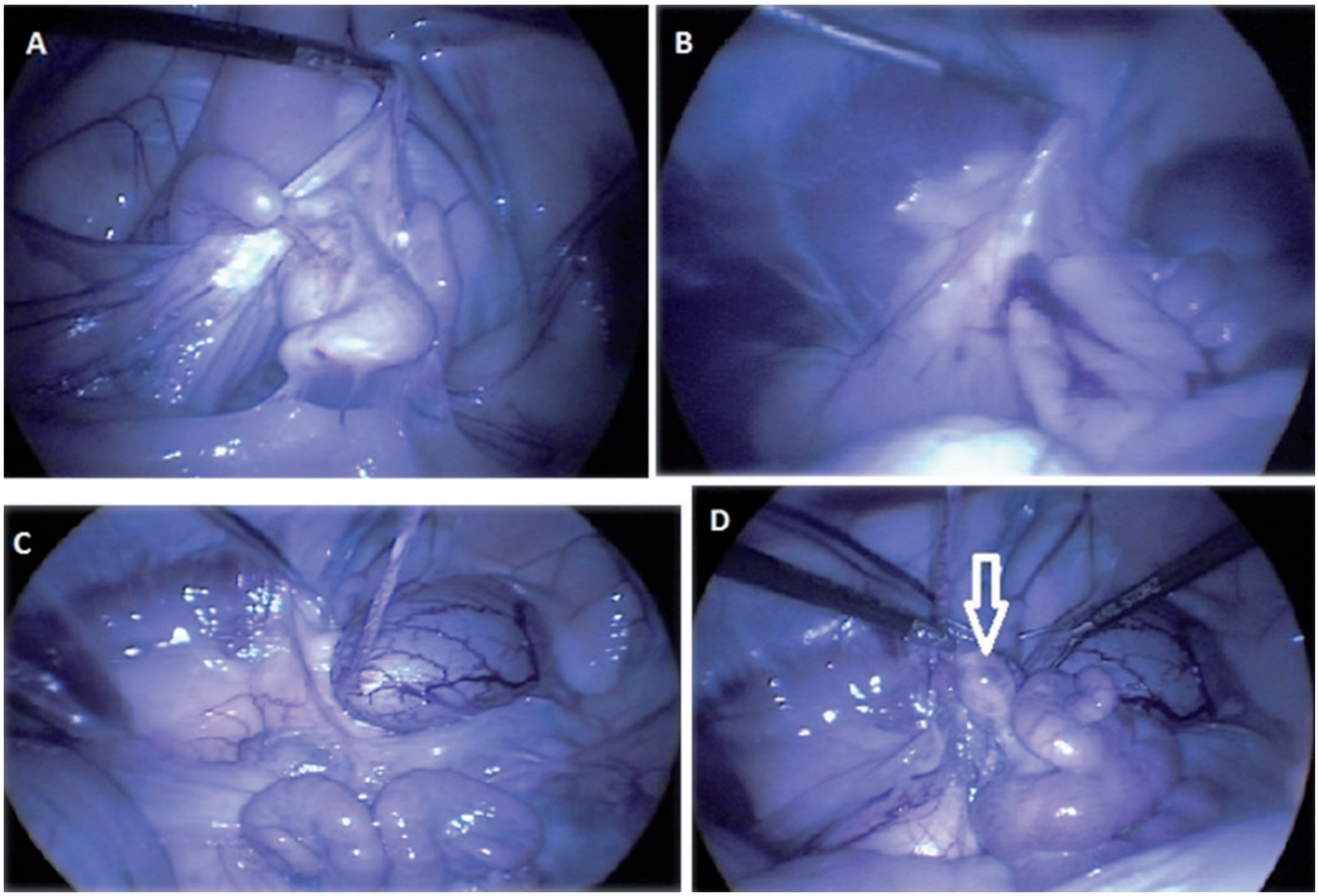

Fig. 5. Images of the abdominal cavity of sheep during diagnostic laparoscopy. (A) massive adhesions between the uterine horns, omentum, and bladder, (B) slight fibrous bands connecting the uterus with the omentum, (C) the uterus without fibrous adhesions, (D) the normal uterus of the control ewe and the presence of an ovary (arrow)

nal and pelvic structures were observed and evaluated by diagnostic laparoscopy. Special attention was paid to the areas where the ovaries used to be located.

Results and discussion

In three sheep, massive adhesions were observed between the uterine horns, omentum, and bladder. In another sheep, only slight fibrous bands were observed, connecting the left uterine horn, omentum, and surrounding tissues. These structures were not found in two other sheep. One ewe, which had not been subjected to ovariectomy, was used to present a normal female reproductive tract (Fig. 5).

Slight adhesions of the reproductive tract to the surrounding tissues were seen, which were similar to those described by Stangl et al. (22). While collecting sheep oocytes by endoscopy, he noted unilateral and bilateral fibrous bands connecting ovaries to the infundibulum.

A proper positioning of the ewe on the operating table played a crucial role in the diagnostic laparoscopy of the genital tract. The sheep were placed in dorsal recumbency on a table inclined at 30-45 degrees to the floor and kept with their head down and their hind legs higher than the head. The caudal topography of the reproductive tract of female sheep makes visualization difficult. Therefore, the Trendelenburg position was used to improve the surgical exposure of the pelvic organs during laparoscopy (4, 12, 16, 27). No complications were observed in any of the ewes during the introduction of gas and other surgical procedures. After the creation of pneumoperitoneum, a consistent intra-abdominal pressure was maintained. It facilitated abdominal access and offered the surgeon a good working space with a very good visualization. It also reduced the danger of complications during trocar insertion (15).

In the present study, 15 mmHg of intra-abdominal CO_2 pressure was applied, as it provided a satisfactory intra-abdominal area (9, 11, 23, 24).

The laparoscopic method resulted in a shorter operative time compared to the traditional laparotomy, which confirms several studies in livestock e.g. ovarian follicular aspiration in the sheep's liver (25), biopsy in sheep (11), and ovariectomy in cows (2).

Laparoscopy is less invasive than conventional open surgery (26). Laparotomy requires an incision in the midline, usually from 6 to 14 inches long, whereas for operative laparoscopy small incisions, of about one quarter of an inch, are made in the abdomen, through which a rigid optic and other instruments are inserted.

Similar observations were made by Bleul et al. (2) in cows after laparoscopic ovariectomy and conventional surgical techniques for this procedure.

The endoscopic approach proved to be a low-invasive method. It greatly facilitated the observation of the abdominal and pelvic cavity, as well as the examination of internal organs (5, 18).

The use of a rigid optic ensured good visualization for evaluating the body cavity and organ tissues. It also reduced the duration of surgery and recovery, as well as the risk of postoperative adhesions. Moreover, it caused less complications and improved the precision of surgery (17).

The literature confirms the above advantages of laparoscopy procedures (8). Bateman et al. (1) and other researchers also indicate a higher therapeutic value and efficiency of laparoscopy compared with traditional laparotomy (1, 7, 20).

Diagnostic laparoscopy provides excellent visualization of the area of interest and can be regarded as an alternative procedure to laparotomy. Laparoscopy seems to be a promising technique and should therefore be used as the gold standard for diagnostic purposes. It is believed that minimal access surgical techniques will become more available in Poland.

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