Standing laparoscopically-aided ovariectomy in mares

R D Gottschalk[a] and S S van den Berg[a]

ABSTRACT

Bilateral ovariectomy was performed in 11 mares and unilateral ovariectomy in 2 mares. The horses were standing and sedated for surgery. After appropriate preparation, a laparoscope was inserted into the abdomen through the paralumbar fossa and the ovary was identified and anaesthetised with local anaesthetic via a custom-built needle. The ovary was then withdrawn from the abdomen through a separate flank incision and removed. The abdomen was not distended with gas before surgery. This method proved to be minimally invasive, rapid and effective.

Key words: laparoscope, mare, ovariectomy, surgery.

Gottschalk R D, Van den Berg S S **Standing laparoscopically-aided ovariectomy in mares**. *Journal of the South African Veterinary Association* (1997) 68(3): 102–104 (En.). Department of Surgery, Faculty of Veterinary Science, Private Bag X04, Onderstepoort, 0110 South Africa.

INTRODUCTION

Laparoscopy in equines has been used as a means of visualising the abdominal contents[5], cryptorchidectomy[6], inguinal herniorrhaphy[7], bladder repair[4], diagnosis of rectal tears and enteritis[5], biopsy procedures[5] and ovariectomy[13,15]. It allows direct visualisation and positive identification of the tissue being resected or investigated. Owing to the small size of the incisions it is considerably less invasive than celiotomy. This markedly decreases surgical morbidity, wound closure time and the risk of herniation and other incisional complications[8,15]. Laparoscopy has gained widespread acceptance in human medicine[10]. The number and variety of surgical procedures performed in horses using laparoscopic guidance has steadily increased during the 1990s[16].

Ovariectomy is indicated in mares with ovarian neoplasia[2], abscessation, haematoma or cysts[14]. Ovariectomy can alleviate objectionable behaviour associated with oestrus in performance or working mares by eliminating cyclic reproductive behaviour, thereby increasing their economic value[3]. Problematic behaviour traits attributed to oestrus in mares are aggression, heterotypical behaviour, nymphomania, lameness, back pain, difficult training or riding, and abdominal pain[11]. It has also been used for hormonal manipulation in embryo-recipient mares[3].

Various surgical approaches to ovariectomy have been described, including colpotomy[3], flank grid celiotomy[17] and ventral midline celiotomy[12,18]. Laparoscopic techniques utilising abdominal insufflation with CO_2, lasers and laparoscopic instrumentation have been described[13,15]. Operative laparoscopic techniques[13,15] have several advantages, including shorter recovery times for healing of surgical incisions, decreased patient morbidity and improved intraoperative observation and manipulation of viscera. This report describes a modified laparoscopic approach to ovariectomy in standing mares without abdominal insufflation and using basic instrumentation.

MATERIALS AND METHODS

Between 14 January 1994 and 3 April 1996, 11 bilateral and 2 unilateral ovariectomies were performed on 13 mares. The indications for ovariectomy were elimination of objectional oestrous behaviour (11 mares) and ovarian neoplasia (2 mares).

A routine clinical examination and complete blood count was performed preoperatively on all mares. Rectal palpation was performed in order to exclude pregnancy, to obtain pre-operative knowledge of the ovarian and uterine status and to ensure the absence of adhesions or masses underlying the site of insertion of the laparoscope.

Roughage was withheld for 72 hours and concentrates for 24 hours pre-operatively. Unlimited access to water was allowed. Horses were kept in stables with wood-shaving bedding.

Pre-operative medication consisted of tetanus toxoid (Onderstepoort Biological Products, Pretoria) intramuscularly, 20 000 iu/kg of procaine penicillin (Depocillin, Intervet) intramuscularly and 2.5 mg/kg of phenylbutazone (Phenapyrin, Kruger Med Pharmaceuticals) intravenously. Detomidine hydrochloride (Domosedan, Ciba Geigy) was administered at 0.01 mg/kg intravenously.

The mares were restrained in stocks and the paralumbar fossa was shaved, scrubbed and aseptically prepared. Local anaesthesia of the paralumbar fossa was achieved by injecting 50 mℓ of 2 % lignocaine (Centaur Labs) subcutaneously and 50 mℓ intramuscularly in an inverted 'L block'. Surgical sites were draped with sterile adhesive plastic drapes (Steri-drape, 3M).

A 1.5 cm incision was made at the level of the ventral aspect of the tuber coxae and equidistant from the cranial border of the tuber coxae and the caudal border of the 18th rib. An 11 mm laparoscopic trocar and cannula (Karl Storz, Germany) was carefully inserted through the incision and flank musculature until the tip of the trocar could be felt to 'pop' through the peritoneum. The trocar was removed once the cannula was introduced into the peritoneal cavity and replaced with a 10 mm operating laparoscope with a 0° viewing angle (Karl Storz, Germany). The insufflating port on the laparoscope was left open and air was allowed to freely enter the abdomen. A video imaging camera (Karl Storz, Germany) and 300-watt xenon light source (Richard Wolf USA) was attached to the laparoscope via a flexible fibre-optic light cable and the ovary identified.

A custom-made guarded hypodermic needle was made by removing the plastic hub from an 18 g needle and gluing the shaft of the needle to PVC tubing *ca* 500 cm long × 1.7 mm diameter (Portex, England). A blunted 18 g needle was then inserted and glued into the opposite end of the PVC tubing. The PVC tubing with the glued-on needle shaft was then passed down the lumen of a plastic bovine insemination pipette.

Once the ovary was clearly identified, the guarded needle was passed down the operating portal of the laparoscope. The

[a]Department of Surgery, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa.

Received: October 1996. Accepted: June 1997.

needle was then exposed and inserted into the ovary and surrounding broad ligament with a stab action. A total of between 10 and 20 mℓ of 2 % Mepivicaine (Intra-epicaine, Arnolds, England) was injected directly into several sites in the ovary as well as the broad ligament via the custom-made needle. While waiting for the local anaesthetic to take effect on the ovary, an incision of 5–8 cm was made through the skin ventral to the 1st laparoscopic portal incision. The external abdominal oblique muscle was then divided by sharp dissection. The internal and transverse abdominal oblique muscles were separated along the direction of their fibres by the use of blunt dissection. Vulsellum forceps were introduced through the wound into the abdominal cavity and, under video visualisation, the cranial pole of the ovary was grasped and the ovary withdrawn through the incision. If large follicles were noted on the ovary these were aspirated using the custom-made guarded needle to facilitate withdrawal through the small abdominal incision.

The hole in the peritoneum was enlarged as necessary to extract the ovary. A Sands emasculator (Holborn, England) was placed around the ovarian pedicle of the exteriorised ovary and kept in position for 2 min, after which the ovary was removed. The emasculator was removed and the stump allowed to return to the abdominal cavity. The ovarian stump was carefully observed via the video-assisted laparoscope to ensure haemostasis. The edges of the external abdominal oblique muscle and the subcutaneous tissues were apposed in 2 layers using O Polyglactin (Vicryl, Ethicon) in a simple continuous pattern. The skin was approximated using 2.0 nylon (Ethilon, Ethicon) in a simple interrupted pattern. The dorsal trocar incision was closed with one or two 2.0 nylon sutures in a simple interrupted pattern. In cases of bilateral ovariectomy, the equipment was moved to the opposite side of the horse and the procedure repeated.

The mares were discharged either on the day of surgery or the following day with instructions to the owners to administer procaine penicillin at 20 000 i.u./kg twice daily and phenylbutazone at 2.2 mg/kg once daily for 4 days. The antibiotic treatment was administered to prevent infection from bacteria that may have entered the abdomen with the aspirated air. The mares were kept stabled for 10–14 days with hand-walking, after which period the skin sutures were removed and the horses allowed to return to normal work.

RESULTS

No serious complications occurred during surgery. In one mare visualisation of the ovaries was impaired owing to distension of the bowel. With minor manipulation of the ovary and the bowel via the operating laparoscope this was easily overcome. The 2 unilateral ovariectomies were performed on mares with a granulosa-theca cell tumour and a spindle cell tumour respectively. These ovaries were 6×8 cm and 8×8 cm respectively and necessitated enlargement of the incision to approximately 8 cm to allow exteriorisation of the ovary. Two mares required additional repeated doses of detomidine hydrochloride during the procedure owing to their fractious temperament. Any intra-operative discomfort was alleviated by the administration of additional local anaesthetic, either into the abdominal musculature or the ovarian stump. No intestinal trauma was caused by trocar insertion. In all but one mare visualisation of the ovary and uterine horn was good. Ovarian size ranged from 3×5 cm to 8×8 cm. Operative time per ovary varied from 14 to 55 min with a mean of 28 min.

The mare with the granulosa cell tumour developed signs of abdominal discomfort 24 hours post-operatively. During rolling, partial dehiscence of the abdominal wound occurred with emphysema of the surrounding subcutaneous tissue. The abdominal pain was thought to originate from a *Babesia equi* infection, diagnosed on haematology. The mare was treated with an analgesic (Flunixin Meglumine, Centaur Labs) and babesiocide (Forray 65, Hoechst). The wound was lavaged daily. Recovery of the mare was uneventful after treatment.

In 3 other horses signs of subcutaneous emphysema were noted around the wounds. This disappeared spontaneously within 4 days. All incisions except the mare with the granulosa cell tumour healed by 1st intention. Cosmetic results were excellent in all cases.

None of the mares were kept with stallions, or teased on a regular basis to detect signs of oestrus. One mare that had undergone a bilateral ovariectomy was seen on several occasions to be showing signs of oestrus in the presence of geldings. With the exception of this mare, the owners were satisfied with the result.

DISCUSSION

Most equine facilities have the equipment to perform arthroscopic surgery. The only additional equipment needed with this technique is a laparoscope, trocar and cannula. The custom-made guarded needle can be produced easily and inexpensively.

Laparoscopic ovariectomy has several advantages over open laparotomy or colpotomy[13], including improved visibility, secure haemostasis, minimal surgical morbidity, decreased post-operative discomfort, and rapid, uncomplicated healing. Added advantages of this modified technique are that relatively little expensive additional equipment is required, bilateral surgery can be performed, and duration of surgery is short.

Traditionally, carbon dioxide gas[5,7,15] or nitrous oxide gas[6] has been used to insufflate the peritoneal cavity in order to create space to manipulate the laparoscope and instrumentation and to prevent inadvertent insertion of instruments into the abdominal organs. It is thought that the carbon dioxide combines with the peritoneal fluid to form carbonic acid, which irritates the peritoneal cavity[5]. Insertion of the laparoscope into the abdomen should be performed carefully[5]. The risk can be minimised by using a disposable laparoscopic cannula with a safety shield (United States Surgical Corporation, Connecticut). On penetration of the abdominal cavity, the tissue resistance is decreased and a safety shield snaps over the trocar, preventing intestinal damage. An alternative is to exchange the sharp trocar for a blunt trocar[6]. A reusable trocar and cannula was used in this trial to minimise costs. In these cases it was found that the trocar could be safely introduced into all mares without prior gas distension. Furthermore, it was found that gas was not necessary for adequate visualisation and manipulation of the ovaries. This may have resulted in less post-operative peritoneal irritation. Most mares were discharged from hospital immediately post-operatively and serial monitoring of the peritoneal fluid was not performed.

Disadvantages of laparoscopy include the cost of additional specialised equipment and the need for appropriate training. Practice is required to obtain anatomical orientation and proficiency with the instruments. Attention to technical detail is required for a successful outcome.

Traditional ovariectomy techniques require an incision large enough to insert a hand and manually withdraw the ovary blindly. Laparoscopy offers the advantage of direct visualisation of the ovary and withdrawal through a small incision, allowing minimal surgical morbidity and an early return to exercise.

Reported laparoscopic techniques require sophisticated laser equipment[13]

and laparoscopic clip applicator and stapling devices[13,15]. The technique described here does not require the use of the additional equipment, resulting in cost savings and reduced surgical time. In this study the mean operative time was 28 minutes. This could be reduced considerably with experience.

Haemostasis was achieved by clamping and crushing the ovarian stump and relying on vascular damage and vasospasm. Although the ovarian pedicle was under tension during the procedure, no haemorrhage was noted in this series. The ovarian stump was visualised after being returned to the abdomen. In the event of haemorrhage, the ovarion stump could have been retrieved using Vulsellum forceps and ligated extracorporeally. Alternatively, haemostasis could have been achieved using laparoscopic suture clips, endoscopic sutures or cautery instruments designed for laparoscopic surgery[8].

The signs of oestrus noted in one mare is not inconsistent with previous studies. In one report of ovariectomy in 11 mares and 4 mules[15], mild signs of oestrus occurred in 2 mares. In another report[9] at least some signs of oestrus were noted in 8 of 23 mares that were bilaterally ovariectomised. These results indicate that there may be sources of oestrogen production other than the ovaries that are responsible for continued oestrus behaviour. In these mares, research has indicated that twice-daily administration of dexamethazone suppresses oestrus activity[1].

This technique for standing laparoscopic ovariectomy is a safe, rapid and effective procedure both for normal and selected diseased ovaries.

ACKNOWLEDGEMENTS

We are grateful to the staff of the Veterinary Academic Hospital, University of Pretoria, for their valuable assistance, especially Mr G Langley for his expert help in the handling and care of the horses and Sr J Smith for her organisational contribution The horses were referred by Drs A Strydom, A Niven and J Oosthuizen. Without their support this clinical trial would not have been possible.

REFERENCES

1. Asa C S Goldfoot D A, Garcia M C, Ginter U J 1980 Dexamethazone suppression of sexual behaviour in ovariectomized mares. *Hormonal Behaviour* 14: 55–64
2. Bosu W T K, Van Camp S C, Miller R B, Owen, R 1982 Ovarian disorders: clinical and morphological observations in 30 mares. *Canadian Veterinary Journal* 23: 6–14
3. Colbern G T, Rongen W J 1987 Ovariectomy by colpotomy in mares. *Compendium of Continuing Education* 9: 1035–1038
4. Edwards III R B, Ducharme N G, Hackett R P 1995 Laparoscopic repair of a bladder rupture in a foal. *Veterinary Surgery* 24: 60–63
5. Fischer Jr A T, Lloyd K C K, Carlson G P, Madigan J E 1986 Diagnostic laparoscopy in the horse. *Journal of the American Veterinary Medical Association* 189: 289–292
6. Fischer Jr A T, Vachon A M 1992 Laparoscopic cryptorchidectomy in horses. *Journal of the American Veterinary Medical Association* 201: 1705–1708
7. Fischer Jr A T, Vachon A M, Klein S R 1995 Laparoscopic inguinal herniorrhaphy in 2 stallions. *Journal of the American Veterinary Medical Association* 207(12): 1599–1601
8. Hendrikson D A, Wilson D G 1996 Instrumentation and techniques for laparoscopic and thoracoscopic surgery in the horse. *Veterinary Clinics of North America: Equine Practice* 12: 235–259
9. Hooper R N, Taylor T S, Varmer D D 1993 Effects of bilateral ovariectomy via colpotomy in mares: 23 cases (1984–1990). *Journal of the American Veterinary Medical Association* 203: 1043–1046
10. Horattas M C, Rosser Jr J C 1993 A new and simple approach to open laparoscopy. *Surgery, Gynecology and Obstetrics* 176: 287–289
11. Jorgensen J S 1996 Effect of the estrous cycle on performance in athletic mares. *Compendium of Continuing Education* 18: 692–699
12. McIlwraith C W, Turner A S 1987 Ovariectomy (tumour removal). In *Equine surgery: advanced techniques*. Lea & Febiger, Philadelphia: 346–351
13. Palmer S E 1993 Standing laparoscopic laser technique for ovariectomy in 5 mares. *Journal of the American Veterinary Medical Association* 203: 279–283
14. Pugh D G, Bowen J M, Gaughan E M 1985 Equine ovarian tumours. *Compendium of Continuing Education* 7: S710–S716
15. Ragle C A, Schneider R K 1995 Ventral abdominal approach for laparoscopic ovariectomy in horses. *Veterinary Surgery* 24: 492–497
16. Stellato T A 1997 History of laparoscopic surgery. *Surgical Clinics of North America* 72: 997–1993
17. Turner A S, McIlwraith C W 1989 Standing flank laparotomy. In *Techniques in large animal surgery* (2nd edn), Lea & Febiger, Philadelphia: 248–253
18. Turner A S, McIlwraith C W 1989 Ventral midline laparotomy and abdominal exploration. In *Techniques in large animal surgery* (2nd edn). Lea & Febiger, Philadelphia 240–247